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Attitudes and beliefs regarding the
“Adductor Strengthening Programme”
among injury prevention delivery agents in
Norwegian male elite football teams

A descriptive cross-sectional study

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Abstract

Introduction: Groin injuries are common in male elite football representing a considerable problem affecting both players and teams. As a response to a call for action, the “Adductor Strengthening Programme” has been shown to substantially reduce the prevalence and risk of groin problems in male football players. The programme is therefore recommended to be implemented as part of football training. However, a key factor to achieve successful implementation in the real-world football context is to understand the implementation context. The two aims of this project are therefore to investigate delivery agents’ attitudes and beliefs regarding the “Adductor Strengthening Programme” using the RE-AIM framework and, to define a suggestion for a “best practice” application of the programme.

Method: This master project is a descriptive cross-sectional study surveying 29 primary delivery agents in Norwegian male elite football teams. A questionnaire with questions about attitudes towards and beliefs about the “Adductor Strengthening Programme”, and how players perform this programme, was completed during the 2020 season.

Results: All delivery agents were aware of the “Adductor Strengthening Programme”, all believed the programme can mitigate the burden of groin problems, 90% believed the programme can enhance football performance, and all stated to use the programme in their team but only 10% did so in accordance with the programme protocol. The programme is in most teams delivered so that the players perform fewer repetitions in each set but with a higher number of sets than in the evidence-based programme protocol. 97% anticipated to use the programme in their team in the following season. The programme’s injury prevention effect and that the programme does not require exercise equipment was stated as the two most important reasons for choosing to use the programme both during the current season and in the following season.

Conclusion: This master project has highlighted that delivery agents have a positive attitude towards the “Adductor Strengthening Programme”, which is widely adopted and anticipated to be maintained in Norwegian male elite football teams. We have also suggested a best practice application of “Adductor Strengthening Programme”, which could be recommended to be implemented as part of football teams training regime.

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Foreword

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Joakim S. Stensø

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1. Introduction

Football (soccer) is the world's most popular sport, with approximately 265 million players and several million people involved as referees and officials in 2006, according to the Big Count of the Fédération Internationale de Football Association (FIFA) (FIFA, 2007). The total number of professional players internationally is nearly 130,000, of which over 50,000 play under the Union of European Football Associations (UEFA) (FIFA, 2019). The risk of getting an injury is high among football players in general and, especially among male elite players (Klein, Henke, & Platen, 2018) where injury rates are substantially higher than in other high-risk occupations (Drawer & Fuller, 2002). These injuries in general can inflict a great burden on individual players, causing participation loss and negative side effects both physically and mentally (Leddy, Lambert, & Ogles, 1994; Lohmander, Englund, Dahl, & Roos, 2007). On a team level, injuries are shown to have an indirect effect on team performance in terms of final league ranking and result in international tournaments (Hägglund, Waldén, et al., 2013), as well as a negative financial impact (Eliakim, Morgulev, Lidor, & Meckel, 2020). Groin injuries specifically represents a considerable problem, accounts for 4-19% of all time-loss injuries and a high weekly prevalence where 32% of players complain about any groin problem.

The volume of research on injury prevention in football has increased in recent years, as highlighted by O'Brien and Finch (2014a) who identifying over 50 intervention studies on the efficacy of injury prevention exercise programmes (IPEPs) in team ball sports. As a result of the growing research, there is now considerably high-quality evidence supporting that IPEPs can mitigate the overall injury burden in football (Brunner et al., 2019; Emery, Roy, Whittaker, Nettel-Aguirre, & van Mechelen, 2015; Herman, Barton, Malliaras, & Morrissey, 2012; Hübscher et al., 2010; Lauersen, Bertelsen, & Andersen, 2014). For groin injuries specifically, Harøy, Clarsen, et al. (2019) demonstrated that the "Adductor Strengthening Programme" reduced the risk of self-reported groin problems in male football players by a significant 41%. The "Adductor Strengthening Programme" is a partner exercise based on the single eccentric exercise "Copenhagen Adduction", described by Serner et al. (2014). "Copenhagen Adduction" is shown to produce great improvements in hip adductor strength (L. Ishøi et al., 2016), which is the only consistently reported modifiable groin injury risk factor (Whittaker, Small, Maffey,

& Emery, 2015). The “Adductor Strengthening Programme” is performed during regular warm-ups and structured as a progressive strengthening phase. It is used two to three times a week during preseason and continuous maintenance periods and used once a week during the regular season. However, intervention studies have shown that evidence-based IPEPs will only result in reduced injury rates if players are compliant (Hägglund, Atroshi, Wagner, & Waldén, 2013; Soligard et al., 2010). Thus, even the most potent injury prevention programmes will have a low impact outside controlled settings in intervention studies unless they are sufficiently adopted, complied with, and sustained in the real-world football context. This also applies to the “Adductor Strengthening Programme”. As a response, Finch (2006) has suggested that research must be directed towards understanding what influences the implementation of IPEPs when such programmes are translated into the less controlled real-world context outside intervention studies. Later, Finch and Donaldson (2010) have argued the factors influencing implementation should be investigated across all levels of the sports delivery hierarchy. This means all the way from the individual player level up to national sporting organisations.

1.1 Research questions

Important influencing factors are attitudes and beliefs regarding IPEPs (Finch & Donaldson, 2010; Finch, White, Twomey, & Ullah, 2011). Attitudes concern knowledge, motivation and expectations about the topic in question, whereas beliefs refer to the opinions about the topic (Jain, 2014; Laake, Olsen, & Benestad, 2008; McCall, Davison, et al., 2015). Attitudes and beliefs towards the “Adductor Strengthening Programme” have previously been investigated by Harøy, Wiger, Bahr, and Andersen (2019). However, attitudes and beliefs by team staff level still need to be investigated, more specifically, in primary delivery agents, who are staff with the main responsibility for preventative training. The primary aim of this master project is, therefore, to examine attitudes and beliefs regarding the “Adductor Strengthening Programme” among delivery agents of preventative training in Norwegian male elite football teams. A secondary aim is to identify a “best practice” application of the “Adductor Strengthening Programme” by investigating how the programme and other relevant preventative measures are applied by delivery agents of preventative training in Norwegian male elite football teams. To answer these aims, the following two research questions have been established for this master thesis:

1. *What are the attitudes towards and beliefs about the “Adductor Strengthening Programme” among delivery agents of preventative training in Norwegian male elite football teams?*

2. *What is considered “best practice” application for the “Adductor Strengthening Programme” among delivery agent of preventative training in Norwegian male elite football teams?*

1.2 The influence of the Coronavirus on this master project

All master students graduating in 2021 were encouraged by the Norwegian School of Sport Sciences to write a few words about special challenges in their work when completing their master thesis due to the coronavirus pandemic. In addition to including questions regarding attitudes and beliefs, the survey conducted in this master project was initially intended to include questions about how the “Adductor Strengthening Programme” was specifically performed by players in the 2020 season. Since the pandemic affected both the preseason and in-season periods in several ways so that the season did not take place under normal circumstances, the relevant questions about programme performance were formulated more generally, without asking specifically about the 2020 season. Otherwise, the master project seems to have been affected to a small degree. However, it is not known with any certainty whether the attitudes and beliefs of participants regarding the “Adductor Strengthening Programme” have been affected due to the pandemic, nor whether the players’ performance in the programme has been affected.

2. Theory

2.1 *Football in Norway*

Just as football enjoys great popularity worldwide (FIFA, 2007), it is also considered the most popular sport in Norway and the Norwegian Football Federation is the greatest national sports federation by far in terms of the number of active memberships (NIF, 2020). According to data from 2016, the country has about 200,000 active football players over 12 years of age. (NFF, 2019). For male adult football specifically, the highest and second highest divisions of football in Norway are the Eliteserien (Norwegian Premier League) and the OBOS-ligaen (Norwegian First Division). These divisions each have 16 teams and therefore 32 teams in total, with the majority of teams being fully professional and the remaining teams being semi-professional.

2.2 *Injuries in football*

Injuries are unwanted side effects of participation in football and other sports. A great deal of epidemiological injury surveillance research has therefore been conducted over recent decades to increase knowledge about the number of injuries, the burden they inflict and the consequences they may bring. A large proportion of epidemiological studies on injury rates in football considers professional players, especially males.

2.2.1 *Injury incidence in football*

In line with several recommendations, injury surveillance studies have historically been reporting injury rates in team sports as injury incidence, calculated as the number of time-loss injuries occurring per 1000 hours of the given exposure (Bahr, Clarsen, & Ekstrand, 2018). Moreover, time-loss injuries are defined as “... an injury that results in a player being unable to take a full part in future football training or match play ...” (Fuller et al., 2006). The UEFA injury study, which is the largest and longest ongoing injury surveillance programme in football, did report an incidence of about eight injuries overall per 1000 hours of football among European male elite professional players (Ekstrand, Hägglund, & Waldén, 2011). A mean overall injury incidence of eight per 1000 hours has later been supported by a larger systematic review by López-Valenciano et al. (2020), including 43 studies, with incidence rates ranging from 1.6 to 19.2 among those included in the studies. More specifically, the injury incidence in male professional football during matches is reported to be almost 10 times higher than

during training, with incidence rates of 3.7 and 36, respectively (López-Valenciano et al., 2020). The authors suggested some of the difference could probably be attributed to higher physical demands, more contact between players and a higher accumulation of fatigue during matches (López-Valenciano et al., 2020).

A larger systematic review by Klein et al. (2018) describes a tendency for a higher overall injury incidence in males compared to females at professional level. This is supported by two studies observing injury incidence rates in male and female professional players during the same period using the same design, one within the same club (Larruskain, Lekue, Diaz, Odriozola, & Gil, 2018) and one within the same level and country (Hägglund, Waldén, & Ekstrand, 2009). Both studies found a significantly higher incidence in male players compared to their female counterparts, with the overall injury incidence in males and females being 8.3 and 6.3 respectively in the study by Larruskain et al. (2018) and 7.7 and 5.5 respectively in the study by Hägglund et al. (2009). Also, in international tournaments, overall injuries are higher in males than females (Junge & Dvorak, 2013). Moreover, the overall injury incidence is reported to be somewhat higher among professional football players compared to amateurs irrespective of their gender, according to Klein et al. (2018). The same authors stated that injury rates among male elite youth players are relatively high, which is supported by findings of higher training injury rates at elite level among young players compared to adult players (Pfirrmann, Herbst, Ingelfinger, Simon, & Tug, 2016). In Norwegian male elite football specifically, the overall injury incidence has been reported by Bjørneboe, Bahr, and Andersen (2014) as somewhat lower than in European male elite professional football, with a mean of 4.8 injuries per 1000 hours of football. A considerably higher incidence rate among players in Norway was seen during matches compared to training also here (Bjørneboe et al., 2014).

In the available epidemiological studies, traumatic injuries seem more than twice as frequent as overuse injuries (López-Valenciano et al., 2020). Most injuries are in the lower extremities, with the highest specific incidence seen in injuries to the thigh, knee, ankle, and hip/groin, in the given order. Muscles and tendons are the most frequently injured tissue type (Klein et al., 2018; López-Valenciano et al., 2020). A similar distribution of injury incidence in terms of location and types has been reported in Norwegian male professional football players, specifically (Bjørneboe et al., 2014).

2.2.2 Injury burden in football

Although injury incidence is useful to provide information about the extent of sports injuries, only considering incidence may give an incomplete and even erroneous picture. Therefore, Bahr et al. (2018) has argued that injury surveillance studies must focus more on the burden of injuries, described as the cross-product of incidence and severity where the latter is defined as the duration of time-loss due to a given injury. Moreover, the concept of injury burden is most often measured as days absent from the sport (due to an injury) per 1000 hours of exposure. This involves providing information about the absence of players from training or matches due to any injury and is considered as better information in terms of the specific injuries that should be reduced (Bahr et al., 2018).

Among European male elite professional football teams who were followed for 11 seasons, Hägglund, Waldén, et al. (2013) demonstrate an mean injury burden of 130 days lost per 1000 hours, including both training and match injuries.

Another study has reported mean overall match and training injury incidence separately. Here, Sprouse et al. (2020) followed English international teams across eight seasons, finding that the injury burden among males was 455 days of absence per 1000 match hours and 36 days lost per 1000 training hours. The injury incidence used to calculate the injury burden by Sprouse et al. (2020) was similar to the overall injury incidence in male professional football in general reported by López-Valenciano et al. (2020). This may suggest that the described match and training injury burden may also be somewhat representative of male professional club football. In comparison, female international team players had a somewhat lower match injury burden, but a slightly higher training injury burden according to Sprouse et al. (2020). No difference was seen in injury burdens between adult and youth players both in male and female players.

2.3 Groin injuries in football

The groin area has previously not been subject to unambiguous specification (Waldén, Hägglund, & Ekstrand, 2015), but the “Doha agreement meeting on terminology and definitions” has described a consensus on a classification system for longstanding groin pain in athletes, including football players (Weir et al., 2015). The classification system describes groin pain as either: (1) Caused by a defined clinical entity of the groin (adductor-related, iliopsoas-related, inguinal-related, or pubic-related causes of groin

pain); (2) Hip-related; (3) Related to other causes (Weir et al., 2015). Although multiple causes for groin pain often are found (Taylor et al., 2018), approximately two-thirds of cases involving groin pain in football players are adductor-related (Hölmich, Thorborg, Dehlendorff, Krogsgaard, & Gluud, 2014; Mosler, Weir, Eirale, et al., 2018; Serner et al., 2015; Taylor et al., 2018).

2.3.1 Groin injury incidence in football

The overall groin injury incidence has been reported to about one injury per 1000 hours of football exposure (López-Valenciano et al., 2020). Moreover, groin and hip injuries combined have been found to account for up to 19% of all time-loss injuries in male elite football players (Waldén et al., 2015), and up to 17% of elite level players suffer from time-loss caused by a groin injury each season (Werner, Hagglund, Ekstrand, & Waldén, 2019). In Norwegian male professional football, Bjørneboe et al. (2014) demonstrated that 11% of all time-loss injuries were located in the groin, with muscle injury to the groin being the predominant type of both severe overuse injuries.

However, a large proportion of injuries in general are due to overuse, causing pain and/or functional limitations and leading to reduced performance, but not necessarily causing time-loss with absence from training or matches (Clarsen, Rønsen, Myklebust, Flørenes, & Bahr, 2014). This also applies to a large extent to groin injuries (Waldén et al., 2015). Therefore, using time-loss as an injury definition and incidence as an injury rate measure are considered to underestimate the real rate of these injuries. As a reaction, Bahr (2009) has recommended using “all physical complaints” as an injury definition, with prevalence as measure for injury rate, since this is more likely to capture the actual extent of overuse injuries. Prevalence represents the proportion of players affected by a given problem at any given time whereas “all physical complaints” can be understood as any complaint related to a problem in a given anatomical region etc. (Bahr, 2009),

Harøy, Clarsen, et al. (2017) investigated the groin injury rate among Norwegian football players across different levels of playing and for both sexes in line with the mentioned recommendation. During a six-week period of match congestion, the authors found that the weekly mean prevalence of all complaints involving groin problems was 29% for male players, ranging from 23% to 32%, with elite players having the highest

prevalence. The prevalence in male elite players was also significantly three times higher than in female elite players (Harøy, Clarsen, et al., 2017). Moreover, only about one-third of groin problems in male players led to time-loss, implying that two out of three of these groin injuries would have gone under the radar of a time-lose injury definition. The authors therefore suggest that the groin injury incidence described in the vast majority of football injury surveillance studies only represents “the tip of the iceberg” (Harøy, Clarsen, et al., 2017).

2.3.2 Groin injury burden in football

A study following 47 European male elite professional teams during 15 seasons demonstrated that the mean burden of hip and groin injuries combined was about 16 days of absence per 1000 hours of football, with seasonal variations ranging between 12 and 24 days of absence (Werner et al., 2019). Among the different clinical entities of hip and groin injuries, adductor-related injuries were the entity that imposed the highest injury burden by far, leading to male professional football players being absent for nine days per 1000 hours of football.

2.3.3 Groin injury risk factors

Risk factors for getting an injury are categorised as non-modifiable or modifiable. Researchers and clinicians often give modifiable risk factors the greatest attention, since they provide a vector for developing IPEPs (Cameron, 2010). Proposed modifiable risk factors of special interest in regard to groin injuries are muscle strength, range of motion, movement patterns and training variables (Short, MacDonald, & Strack, 2021). However, the only identified modifiable risk factor consistently associated with groin injury in sports relates to reduced isometric or eccentric hip adductor strength that is both isolated and relative to ipsilateral hip abductor strength (Whittaker et al., 2015). Reduced hip adductor strength being the only consistently reported modifiable groin injury risk factor also applies to male football players at professional level (Markovic, Šarabon, Pausic, & Hadžić, 2020; Mosler, Weir, Serner, et al., 2018). Interestingly, a deficit of more than 20% in eccentric hip adductor strength has been observed in football players with adductor-related groin pain when compared to asymptomatic equivalent controls (Thorborg et al., 2014).

2.4 Consequences of the injury burden in football

The magnitude of football injuries described above can constitute a great burden on individual players in terms of their health and performance and on football teams for the availability of players, performance, and finances. In the specific case of male professional football players, Drawer and Fuller (2002) has put the injury burden into context by estimating the injury rate among these players to be approximately 1000 times higher than injury rates in other high-risk occupations.

On the individual level, football injuries indisputably contribute negatively to the physical health of players in the short term, where being physically injured is also associated with negative consequences on the mental health of athletes (Leddy et al., 1994; Pearson & Jones, 1992; Smith et al., 1993). Some injuries are shown to have negative long-term effects on physical health (Lohmander et al., 2007). An injury burden consequence that has attracted increasing attention in football in recent years is concussion. Despite being relatively infrequent, concussion may present severe and lasting negative health consequences such as neurodegenerative diseases like Alzheimer's and Parkinson's in the long term (Gardner & Yaffe, 2015; Owoeye, VanderWey, & Pike, 2020). To our knowledge, long-term consequences of groin injuries have not been investigated specifically.

On the team level, injuries affect player availability in training and matches. In male professional football teams, the a higher injury burden is associated with player unavailability for matches and lower final domestic league ranking and reduced success in an international tournament (Hägglund, Waldén, et al., 2013). Similar associations between injury rates and team success have also been described in other studies (Carling, Le Gall, McCall, Nédélec, & Dupont, 2015; Eirale, Tol, Farooq, Smiley, & Chalabi, 2013). Furthermore, having more players unavailable for matches due to injuries is associated with an increase in the physical outputs in professional teams in matches (Windt, Ekstrand, Khan, McCall, & Zumbo, 2018). Regarding financial aspects, it has been stated that the mean cost for a first team player being injured for one month is approximately 500,000 euros in European elite professional football. In Australian professional football, the mean salary costs of players being absent due to injury was equivalent to the investment of the mean yearly salary of two players (Lu et al., 2020). Moreover, Eliakim et al. (2020) estimated that English Premier League teams

loose on average about 45 million pounds per season due to injuries, based on under-achievement due to lower player availability and no salaries paid to players. However, the English Premier League involves more money than other leagues (Cox, 2018) and this absolute number is, therefore, hardly representative of the average professional team in other countries.

2.5 Effects of injury prevention exercise programmes

The high burden of injuries among football players has raised awareness over the last decades, and several conceptual models for research into prevention of sports injuries have therefore been introduced. Arguably, the most renowned model is the “Sequence of Prevention” (SOP) model presented by van Mechelen, Hlobil, and Kemper (1992). The model was an initiative for an evidence-based prevention strategy, presenting a four-step approach to achieve efficacious preventative interventions. First, to identify the incidence and severity of a potential injury. Second, the identification of factors and mechanisms in regard to the occurrence of the injury. Third, to introduce a measure likely to reduce the future risk and/or severity of the relevant injury. Finally, evaluating the effect of the measure by repeating the first step (van Mechelen et al., 1992).

2.5.1 Injury prevention exercise programmes in general

Following the steps more or less in line with the “SOP” model, intervention studies have, in recent years, produced solid evidence of IPEPs as efficacious in reducing injury rates both generally and in lower limbs specifically and in lower levels in different sporting populations. This is demonstrated in a number of systematic reviews with and without meta-analyses (Brunner et al., 2019; Emery et al., 2015; Herman et al., 2012; Hübscher et al., 2010; Lauersen et al., 2014). These studies include IPEPs with different characteristics, including warm-ups, strength training exercises and exercises without equipment. Specific for professional football players at the elite level however, a recent systematic review by Fanchini et al. (2020) found limited evidence to support exercise-based injury prevention programmes to prevent muscle injuries. These authors argued that the existing intervention studies had too high a risk of bias to provide any confidence in the actual programme efficacy.

An example of an evidence-based injury prevention exercise shown to reduce injury rates in football players is the eccentric strength training exercise, “Nordic Hamstring”. Arnason, Andersen, Holme, Engebretsen, and Bahr (2008) demonstrated that the “Nordic Hamstring”, when used in warmups, provided at least a 50% lower overall incidence of hamstring injuries in male elite level football players. Soligard et al. (2008) reported a significant reduction in overall injuries and severe injuries of about one-third and 50%, respectively, among young female football players performing the IPEP warm-up “FIFA 11+”. The preventative effects of “FIFA 11+” among youth male and female football players and in non-professional adult male players are also reported (Al Attar, Soomro, Pappas, Sinclair, & Sanders, 2016; Thorborg et al., 2017). Another IPEP showing effects with regard to mitigating the injury burden is the Swedish warm-up programme, “Knee Control”. Waldén, Atroshi, Magnusson, Wagner, and Hägglund (2012) found the programme, aimed at reducing anterior cruciate ligament (ACL) injuries, to significantly reduce the rate of these injuries by 64%, in a randomised controlled trial including 4,500 youth female players. Investigations of countrywide use of “FIFA 11+” and region-wide use of the “Knee Control” programme have demonstrated reduced injury burdens in football players regarding overall injuries and ACL, respectively (Junge et al., 2011; Åman et al., 2018).

2.5.2 Groin injury prevention exercise programmes

Regarding groin injuries specifically, limited success has been reported in studies investigating more or less groin specific IPEPs in sports in general (Esteve, Rathleff, Bagur-Calafat, Urrútia, & Thorborg, 2015). In the available literature, two previous studies examined the efficacy of multicomponent IPEPs in football players (Engebretsen, Myklebust, Holme, Engebretsen, & Bahr, 2008; Hölmich, Larsen, Krogsgaard, & Gluud, 2010). These studies reported no significant efficacy on groin injuries in players performing the programmes, although Hölmich et al. (2010) described a promising 31% reduction of these given injuries.

However, a recent study by Harøy, Clarsen, et al. (2019) demonstrated a groin-specific IPEP to be efficacious in reducing the prevalence and risk of groin injuries in football players. In the study, the risk of all self-reported groin problems was significantly 41% lower in male football players performing the “Adductor Strengthening Programme”, compared to a similar control group. Here, Harøy, Clarsen, et al. (2019) recorded groin

problems with an “all physical complaints” definition using the Oslo Sports Trauma Research Centre (OSTRC) Questionnaire on Health Problems. This enabled monitoring of both acute and overuse groin injuries irrespective of severity, including injuries not leading to time-loss, which is described as an approach to injury registration suitable in studies when overuse injuries are expected to dominate (Clarsen et al., 2014).

The “Adductor Strengthening Programme” is a partner exercise based on a single eccentric exercise, the “Copenhagen Adduction”, first described by Serner et al. (2014), which can be performed at the pitch side without equipment. The “Copenhagen Adduction” is shown to highly activate the adductor longus muscle demonstrated by EMG evaluation (Serner et al., 2014) and to produce large eccentric hip adductor strength gains of up to 40% (Dawkins, Ishøi, Willott, Andersen, & Thorborg; Harøy, Thorborg, et al., 2017; L. Ishøi et al., 2016; Kohavi et al., 2020; Polglass, Burrows, & Willett, 2019). Since the “Copenhagen Adduction” might be painful for some players, two easier levels have been added in the “Adductor Strengthening Programme”. The easiest level consists of a side-lying hip adduction, while the moderate and hardest levels are as in the “Copenhagen Adduction” (Serner et al., 2014), but with shorter and normal lever arm, respectively (Harøy, Clarsen, et al., 2019).

The “Adductor Strengthening Programme” is recommended to be performed as one set on each side during warm-up before regular football training two to three times a week in preseason and once a week throughout the regular season (Harøy, Clarsen, et al., 2019). The programme protocol is structured as a preseason strengthening phase with a weekly progressive number of repetitions performed two to three times per week, and a continuous in-season maintenance phase with a fixed number of repetitions performed once per week. The intention is that the prevalence of groin injuries is reduced in parallel to improved strength, which is then maintained throughout the season. When performing the adductor programme, players are asked to start at the highest level. If pain described as more than three on an 11-point numeric rating scale (NRS 0-10, where 0 is equivalent to pain-free and 10 is maximal pain) is experienced during the exercise, players are instructed to perform the exercise at one easier level (Harøy, Clarsen, et al., 2019). An illustration of the levels and execution of the “Adductor Strengthening Programme” is shown in **figure 1**, while a detailed description of the programme protocol, can be reviewed in **table 1**, both as described by Harøy, Clarsen, et al. (2019).

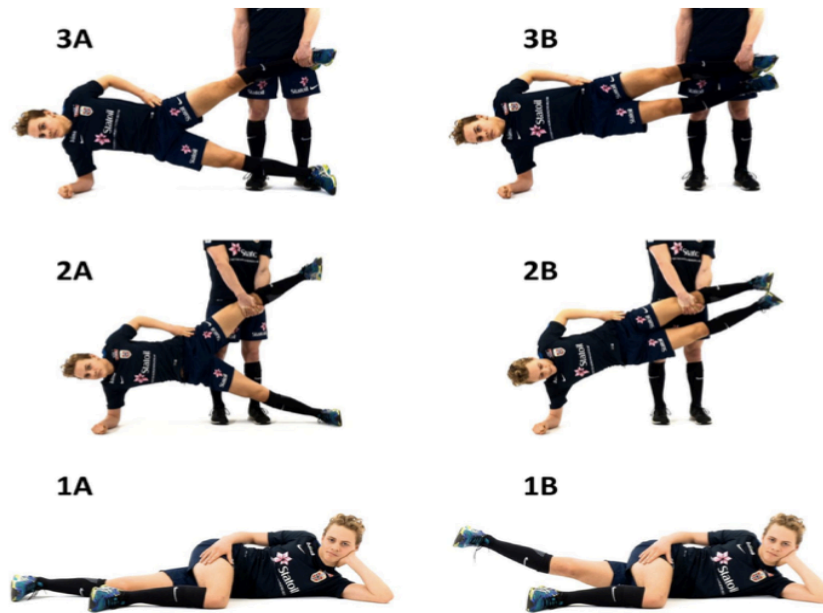


Figure 1: Illustration of the levels and execution of the “Adductor Strengthening Programme” from Harøy, Clarsen, et al. (2019). Permission to reproduce is obtained.

Table 1: Training protocol for the “Adductor Strengthening Programme”, inspired from Harøy, Clarsen, et al. (2019). Permission to modify is obtained.

	Week	Sessions per week	Sets per side	Repetitions per side
Preseason (weeks)	1	2	1	3-5
	2	3	1	3-5
	3-4	3	1	7-10
	5-6	3	1	12-15
	7-8	2	1	12-15
In-season		1	1	12-15

2.5.3 Compliance with efficacious injury prevention programmes

High compliance among players with the “Adductor Strengthening Programme” has been suggested by Harøy, Clarsen, et al. (2019) as a main reason for the programme’s significant injury preventive effect in addition to the exercise programme itself.

Compliance refers to whether an individual conforms to recommendations from professionals, regarding prescribed dosage, timing and frequency of an intervention or programme (Jay, Litt, & Durant, 1984). In the mentioned study by Harøy, Clarsen, et al. (2019), players completed on average 70% of the recommended training protocol. This is in contrast with the previous groin injury prevention study by Engebretsen et al.

(2008) where less than 20% of the players performed at least two-thirds of the recommended training protocol. Factors promoted as likely advantageous for higher compliance with the “Adductor Strengthening Programme” includes the single-exercise approach, and the low frequency, especially in-season leading to the programme not being very time consuming (Harøy, Clarsen, et al., 2019).

Similar findings was demonstrated regarding both “FIFA 11+” and “Knee Control”. Soligard et al. (2010) reported that the preventative effects of “FIFA 11+” increased with the rate of compliance. Here, a significant 35% lower injury risk was seen in female youth players performing on average 1.5 sessions per week, compared to players performing on average 0.7 sessions. Similar, Steffen et al. (2013) showed that the risks of getting both overall and lower extremity injuries were significantly lower in players with an unquantified high compliance to “FIFA 11+” compared to players with medium compliance. In terms of “Knee Control”, a subsequent sub-analysis found an 88% lower rate of ACL injuries among players with an unquantified high compliance, compared to players with a low compliance (Hägglund, Atroshi, et al., 2013). Interestingly, the ACL injury rate among players with low compliance did not differ significantly from players in a control group not performing any specific ACL injury preventative IPEP.

High compliance as substantially important to achieve the effects of IPEPs are well known in intervention studies (Edouard, Steffen, Navarro, Mansournia, & Nielsen, 2020; van Reijen, Vriend, van Mechelen, Finch, & Verhagen, 2016). Moreover, a meta-analysis by Steib, Rahlf, Pfeifer, and Zech (2017) implicated that an injury risk would be reduced somewhat in line with increased use of a given IPEP, acting as a dose-response relationship. A dose-response relationship on prevention of sports injuries with programmes containing strength training has been described in another meta-analysis where a 10% increase in the number of repetitions was associated with 4.3 percentage points in risk reduction (Lauersen, Andersen, & Andersen, 2018). Indications of such a dose-response relationship have been described specifically for “FIFA 11+” (Soligard et al., 2010). The authors of the mentioned meta-analysis reported that the highest injury risk reductions were attained when programmes were performed two to three times a week, with a weekly total volume of 30-60 minutes of injury preventative training (Steib et al., 2017). Thus, usage of IPEPs must be high enough if football teams and players are to achieve a reduced injury risk with these programmes.

2.6 Injury prevention implementation models and frameworks

It is typical for IPEPs demonstrated as efficacious in intervention studies that their effectiveness is observed under more or less strictly controlled settings. A substantial challenge with these evidence-based IPEPs however, is that they risk losing much of their reported injury preventative effects when they are translated into a less controlled real-world context (Finch & Donaldson, 2010; O'Brien, Donaldson, & Finch, 2016). Understanding the real-world implementation context including what influences the uptake of evidence-based IPEPs under real-world conditions is therefore important, if the maximal impact of these programmes is to be achieved (Donaldson, Callaghan, et al., 2019). Uptake is defined as whether an individual accepts the use of something in particular (Allen, 2016), e.g., accepting the use of an IPEP.

2.6.1 The TRIPP framework

As a response to enhance real-world injury prevention advances, Finch (2006) has outlined the Translate Research into Injury Prevention Practice (TRIPP). Here, she argues that scientific efforts must also be directed towards understanding what influences implementation. This broad use of the word implementation is defined as "...a specified set of activities designed to put into practice an activity or program of known dimensions" (Fixsen, Naoom, Blase, Friedman, & Wallace, 2005). Thus, implementation of IPEPs refers to active efforts to incorporate these programmes at different levels, e.g., at player and team level.

Model stage	TRIPP	van Mechelen et al 4 stage approach [1]
1	Injury surveillance	Establish extent of the problem
2	Establish aetiology and mechanisms of injury	Establish aetiology and mechanisms of injury
3	Develop preventive measures	Introduce preventive measures
4	"Ideal conditions"/scientific evaluation	Assess their effectiveness by repeating stage 1
5	Describe intervention context to inform implementation strategies	
6	Evaluate effectiveness of preventive measures in implementation context	

Figure 2: Illustration of the Translate Research into Injury Prevention Practice (TRIPP) framework by Finch (2006). Permission to reproduce obtained.

TRIPP, as shown in **figure 2** is a six-step approach building on the “SOP” model by van Mechelen et al. (1992), with step one to three being more or less equal. However, the fourth step in the TRIPP framework represents the discrepancy with the “SOP” model as it underlines that intervention efficacy is typically evaluated under “ideal conditions” in controlled settings. This can refer to, for example, teams and players being convinced to participate and provided with appropriate resources, with compliance enhanced through reminders and other incentives (Finch, 2006).

Then, in the fifth step, she recommends researchers attempt to understand how evidence-based IPEPs can possibly be translated into interventions that can be implemented in the real-world sport context. Information about attitudes and beliefs about the causes of injury and preventative measures, as well as barriers and facilitators to the uptake and implementation of the given programme are key elements to this step (Andersson, Bahr, Olsen, & Myklebust, 2019). The sixth and final step involves whether an intervention is efficacious when implemented in a real-world context with all its complexity (Finch, 2006).

2.6.2 The RE-AIM framework

For researchers to understand the full complexities of the implementation context, it has been recommended to integrate the Reach Efficacy Adoption Implementation Maintenance (RE-AIM) framework, which was outlined by Glasgow, Vogt, and Boles (1999) during late 90's. The framework was developed to achieve progress in public health promotion, by addressing the barriers that community interventions are facing when being implemented in clinical settings under real-world conditions. Therefore, the RE-AIM framework suggests a procedure where five key dimensions should be evaluated in a given order, to optimise the implementation process. These key dimensions are shown in **figure 3**, and will be described in the next section in line with an operationalisation and expansion of the dimensions, by Forman, Heisler, Damschroder, Kasselitz, and Kerr (2017).

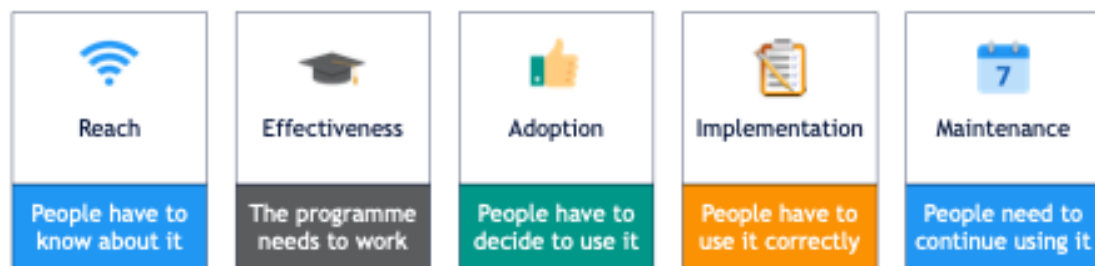


Figure 3: Illustration of the dimensions in the RE-AIM framework, by J. Harøy (unpublished) inspired from Glasgow et al. (1999) and Finch and Donaldson (2010). Permission to reproduce is obtained.

Reach considers whether the target group knows about the particular programme. This includes asking questions on barriers to enrolment and how potential barriers can be addressed, as well as how variations in Reach between different sites can be explained. Effectiveness, on the other hand, deals with whether the investigated intervention is accomplishing its goal, e.g., being effective in preventing injuries, and which conditions and mechanism contribute to the effectiveness. Adoption is considering to what extent those targeted to deliver an intervention are actually participating, e.g., using the particular programme. Implementation is about to what extent an intervention is consistently implemented as intended. It should be noted that this understanding of “implementation” as a specific dimension in RE-AIM, is different from the broader definition of implementation used in this master thesis. Finally, maintenance considers to what extent an intervention becomes part of routine practices and maintains effectiveness when it continues to be used, according to Forman et al. (2017).

2.6.3 The RE-AIM Sports Setting Matrix

To direct efforts towards the understanding of the full complexities of real-world implementation of interventions specific to the sport setting, Finch and Donaldson (2010) presented the RE-AIM Sports Setting Matrix (SSM). This is an extension of the original work by Glasgow et al. (1999). The Sports Setting Matrix is developed to be individualised to the specific level targeting an intervention. This is due to the recognition that all levels across the sports setting hierarchy are influencing the rate of uptake of the effectiveness of sports injury prevention interventions. Moreover, the hierarchy highlights that setting-related factors of sports delivery are most likely to be at least as important and more numerous than the factors directly related to the individual player (Finch & Donaldson, 2010).

Implementation of any IPEP at the team level, relies substantially on the structures to support the delivery of the programme. The way in which RE-AIM SSM could be used to investigate these structures is illustrated by Finch and Donaldson (2010): Firstly, delivery agents, i.e., the team staff responsible for the delivery of IPEPs to the players, have to know about the programme and how to optimise delivery to ensure high compliance, as well as rationale for prevention and performance benefits. Secondly, delivery agents need to fit the programme into the team's regular training regime and still ensure it is delivered as intended to gain maximal effect. Although attention towards research on implementation in the real-world sports context has been growing over the years, there is still inadequate reporting of core components of the implementation process in sports (O'Brien & Finch, 2014b). It is recommended that future research should focus on how stakeholders take up an intervention, their knowledge about it, how they use it on the training field and whether they will continue using the programme for a long-lasting adoption (Finch, 2011).

2.7 Implementation of injury prevention exercise programmes

Achievement of high compliance to IPEPs when implemented in the real-world football context is complex and difficult. This highlights the gap in research under ideal conditions on implementation of evidence-based programmes in the uncontrolled, real-world context. For example, after a countrywide implementation campaign in Switzerland only just over half of coaches in amateur football teams stated that they used the evidence-based "FIFA 11+" (Junge et al., 2011). This study did not differ

between full and partial implementation and it is likely that many coaches did not use the programme according to its protocol. A similar investigation of implementation of the evidence-based “Knee Control” programme among coaches in female youth amateur football in several Swedish football districts through participation in the original intervention study has been conducted by Lindblom, Waldén, Carlford, and Hägglund (2014). The study revealed that although almost 75% of current coaches did use the programme, where only a quarter of current coaches followed the programme protocol as intended. The “Knee Control” programme has also been used by O'Brien, Hägglund, and Bizzini (2018) to exemplify the rocky road from controlled intervention studies to real-world injury reduction. These authors estimated that the 64% reduction in ACL injuries initially shown by Waldén et al. (2012), ultimately had dropped to 12% reduction. The drop was estimated based on reductions in the proportion of teams who used the programme, who used the programme properly, and who maintained it over time, based on findings by Lindblom et al. (2014).

However, there is a discrepancy between the delivery of IPEPs in the real-world context of amateur and professional football. Compared to amateur football where the coach has been identified as the primary delivery agent of IPEPs (Bizzini & Dvorak, 2015), in the professional football context, it is delivered by larger multi-disciplinary staff. This includes a daily presence of more specialised personnel, including strength and conditioning coaches and physiotherapists in addition to football coaches. Moreover, professional football teams have a higher training frequency, with organised training sessions almost daily (O'Brien, Young, & Finch, 2017b).

Among four youth professional football teams, O'Brien, Young, and Finch (2017a) observed that across the 49-week football season, there was 28 instances where a team did not perform any IPEPs during a calendar week. This implies that each team on average used an IPEP in one form or another at least once a week in 42 of the 49 weeks of the football season. Another study by the same authors based on the same observations, reported that “FIFA 11+” as a specific evidence-based IPEP was implemented according to its protocol and in modified forms in only 12% and 28% of the training sessions, respectively (O'Brien et al., 2017b). Moreover, fitness coaches were usually the primary delivery agents of IPEPs followed by physiotherapists. These delivery agents used multiple delivery formats, with warm-up and separate training

without football being most often used and multiple delivery locations with indoor pitch training, outdoor pitch training and sports hall locations mainly used, according to O'Brien et al. (2017a).

Implementation of “FIFA 11+” generally and “Nordic Hamstring” specifically has been investigated by Al Attar et al. (2018) among coaches in 60 professional and semi-professional football teams, half from Australia and half from Saudi Arabia. About three quarters of coaches in Australian teams and 40% of coaches in Saudi Arabian teams had implemented “FIFA 11+”. However, among the Australian coaches who had implemented the programme, only 70% used the full programme as prescribed in the programme protocol. Regarding “Nordic Hamstring”, half of coaches in Australian teams and 70% of coaches in Saudi Arabian teams had implemented the exercise as recommended. An even lower implementation of “Nordic Hamstring” has previously been demonstrated by Bahr, Thorborg, and Ekstrand (2015) among European elite professional football teams. Al Attar et al. (2018) concludes that there is a substantial gap between the recommendations for “FIFA 11+” and “Nordic Hamstring” to achieve its full injury preventative potential and real-world practise among surveyed coaches.

Implementation of IPEPs in general in male adult elite level professional football teams has been investigated in a few studies. In a selection of 44 teams from various premier leagues, every team had implemented such a programme, but only 80% reported to include eccentric exercises (McCall et al., 2014). Almost 90% of these teams reported a frequency where the injury prevention training was performed at least twice weekly all season and where three quarters of the respondents replied to individualise exercises for each player. Among 32 of the national teams in a world cup, McCall, Davison, et al. (2015) found that approximately 90% had implemented an IPEP, but its components are not mentioned. Only one of these team did not individualise the programme to each player. In another study, McCall, Dupont, and Ekstrand (2016) reported that out of 32 surveyed teams ranked among the best in different European countries, 31 had implemented an IPEP, but its components were unknown. There was a more or less reduced total training volume demonstrated for preventative exercises during periods with higher match congestion compared to lower match congestion in all studies (McCall et al., 2014; McCall, Davison, et al., 2015; McCall et al., 2016).

2.8 Attitudes and beliefs

As mentioned, recent research on the implementation of sports IPEPs has emphasised that a key step to increase a programme's success is to develop an understanding of the specific context in which it is to be delivered. The delivery of these programmes requires tailoring to the specific target setting, which also includes consideration of attitudes and beliefs towards such programmes (McKay, Steffen, Romiti, Finch, & Emery, 2014; Twomey, Tla, Lloyd, Elliott, & Finch, 2014). The terms 'attitudes and beliefs' are frequently used across the literature where factors influencing the implementation context are investigated. These terms are rarely defined and they are often mentioned in parallel to knowledge and behaviour. Attitudes can, in general terms, be understood as the degree to which an individual has a favourable or unfavourable overall evaluation of the topic in question, e.g., towards an IPEP (van Lange, Kruglanski, & Higgins, 2011). This evaluation is linked to the individual's knowledge, motivation and expectations (Laake et al., 2008). Furthermore, attitudes both influence and are influenced by cognitive, affective and behavioural information or components in a dynamic manner rather than being passive constants (Jain, 2014).

Beliefs provide a basis of an attitude's cognitive component, as beliefs refer to the cognitive information, e.g., an opinion or thought that an individual has about the topic in question (Jain, 2014). This could be the beliefs one has regarding a programme, referring to whether the programme is important or not, whether the programme will provide any positive or negative contributions, etc. The behavioural component includes the verbal or non-verbal tendencies of an individual, consisting of actions and responses as a result of interactions with the topic in quest (Jain, 2014). This involves whether one is responding favourably or unfavourably to do something, for example, if the person is willing to use a given programme to mitigate an injury burden.

Numerous factors influence how and why attitudes are formed. In a novel summary, Cherry (2020) has described key factors influencing how and why attitudes are formed: direct personal experience, seen as a strong predictor of future behaviour. Social influence, in terms of roles and norms relating to how people believe they are expected to behave. Classical and operant conditioning is when given attitudes that an attitude object is repeatedly associated with bring a positive or negative stimulus or feedback from the surroundings, respectively. And finally, observation, as people are likely to

adopt develop or adopt attitudes to be in concordance with the attitudes of those who are admired within any particular field or group Cherry (2020). Classical conditioning is especially stated as strongly facilitating a wanted attitude towards the topic in question: the more an individual believes that the topic, e.g., an IPEP, will provide a wanted outcome, e.g., a mitigated injury burden or secondary effects from it, the stronger the intention will be to use such an IPEP (Ajzen, 2012).

Although attitudes and beliefs are not perfectly aligned with actual behaviour in humans (Ajzen, 2012; Chaiklin, 2011), attitudes and beliefs among stakeholders somewhat influence their behaviour towards endorsing IPEPs in football (McKay et al., 2014). Hence, different attitudes and beliefs towards IPEPs can act as either barriers or facilitators to the implementation process.

2.9 Attitudes and beliefs about implementation

Despite its importance, information about specific IPEP implementation components in team ball sports in general, is sparse in the published literature (O'Brien & Finch, 2014a). This includes investigations of different attitudes and beliefs towards implementation. Some studies have, nevertheless, performed such investigations in amateur teams with regard to the mentioned “FIFA 11+” and “Knee Control”. Attitudes and beliefs towards “FIFA 11+” have been investigated by Shamlaye, Tomšovský, and Fulcher (2020) among 158 football coaches predominantly at amateur level. Here, over 90% of coaches strongly believed that an IPEP used in warmup was an important preparation for training and matches and a similar number believed the programme could reduce injuries among players. About 90% reported using “FIFA 11+”, of which two-thirds stated they used all its components. Half of the coaches modified the programme to better fit their team. Interestingly, coaches were more likely to use the programme in some way if they coached teams at higher levels. The main perceived barrier by coaches to use the “FIFA 11+” was a lack of time followed by the programme being too boring and too long. The main perceived facilitators were knowledge, programme awareness and evidence of performance enhancement (Shamlaye et al., 2020). Similar attitudes beliefs towards “FIFA 11+” among coaches in amateur football are supported in other studies (Donaldson, Callaghan, et al., 2019; McKay et al., 2014).

Regarding the “Knee Control” programme, Lindblom, Carlford, and Hägglund (2018) found that coaches believed their attitude towards the programme was crucial for using it, but that resources and support from other coaches and personnel, as well as player motivation were also important. Moreover, many coaches modified the programme to improve the players motivation for using it (Lindblom et al., 2018). Barriers and facilitators to implementation of exercise programmes to prevent ACL injuries similar to “Knee Control” are in line with the main barriers and facilitators described regarding “FIFA 11+” (Dix, Logerstedt, Arundale, & Snyder-Mackler, 2021; Joy et al., 2013).

However, as mentioned, there is a discrepancy between amateur and professional football teams as the latter, among other differences, has a larger multi-disciplinary staff team, including the daily presence of strength and conditioning coaches and physiotherapists in addition to football coaches (O'Brien & Finch, 2016). To examine the attitudes and beliefs regarding the implementation of injury prevention in professional football teams as described in previous studies, a literature search was performed in the PubMed database. The keywords used were “injury prevention”, “football injury prevention”, and “implementation” and various combinations of attitudes, beliefs, facilitators, barriers and delivery. Additionally, the reference lists of relevant studies were checked to identify other relevant studies. The inclusion criteria were that the study had to deal with football at professional level. Exclusion criteria was including other participants than team staff as participants. **Table 2** shows a schematic summary of relevant articles on attitudes and beliefs regarding the implementation of an IPEP in male professional football teams.

Table 2: Overview of relevant studies on attitudes and beliefs among team staff in professional football teams regarding implementation of injury prevention programmes.

Study	Design	Aim	Participants (n)	Results
O'Brien et al. (2016)	Cross-sectional survey.	To determine injury prevention perceptions of different team staff members in male youth professional football teams, with special regard to FIFA 11+.	Head coaches, fitness coaches and physiotherapists (n=18).	89-100% agreed that players are at high risk of sustaining lower limb injuries, and unanimously agreed that such injuries can be prevented. 89% believed IPEPs can be performed both before and after football training. Sixty-one % were aware of FIFA 11+, and 28% stated to use the programme where 22% used it in modified form. 44% believed that FIFA 11+ could be maintained in their team over several seasons. Seventy-eight % indicated that the programme needed improvements where the team should develop its own version. Perceived barriers and facilitators to IPEP maintenance were in particular staff acceptance of IPEPs, staff number and continuity.
O'Brien et al. (2017)	Secondary analysis of prospective observations.	To determine the reasons for use and modification of injury prevention exercises with special regard to FIFA 11+.	Same participants as O'Brien et al. (2016).	The most frequent reason for IPEP modifications were to add variation, progression, challenge and individualisation, which was ultimately perceived as important to increase players motivation and avoid boredom. Another frequently reported reason was to align the preventative exercises with other training goals. The strength training section of FIFA 11+ was believed to have high value, although it was emphasised that volume and intensity of such training required careful coordination with other football training.
McCall et al. (2014)	Cross-sectional survey.	To determine injury prevention perceptions in male adult professional football teams.	Sport science staff, physiotherapists, and medical doctors (n=44).	Top three perceived injury risk factors were previous injury, fatigue, and muscle imbalance. 100% stated that IPEPs were of benefit and all prescribed such programmes for the players. The five most used exercises used to prevent injuries were core, balance, stretching, eccentrics and Nordic hamstring, in the given order. Eccentric exercises were the exercise type perceived as most effective in preventing injuries.
McCall et al. (2015)	Cross-sectional survey.	To determine the main challenges and issues faced by practitioners regarding injury prevention.	National team medical doctors (n=37).	Top three perceived main challenges faced in injury prevention was optimising individualisation, compliance from players and staff, and limited time available.
McCall et al. (2020)	Delphi survey.	To determine the perceived most effective exercises programmes to prevent muscle injuries, and when and how to prescribe these exercise programmes.	Experienced sports practitioners not further described (n=21).	There was consensus on the belief that the most effective exercise type in terms of muscle injury prevention were sprinting and high-speed running, followed by eccentric exercises and concentric exercises. It was also consensus on the belief that eccentric exercises could be performed both before and after football training. It was not reached consensus about the ideal range of a number of sets and repetitions.

O'Brien and Finch (2016) have conducted an evaluation of the perceptions of different delivery agents in the mentioned four youth professional football teams, including both football coaches, fitness coaches and physiotherapists. Here, almost every delivery agent believed that professional players are at high risk of suffering an injury and that injuries impact negatively on team performance. Every delivery agent believed that some injuries were possibly preventable. Moreover, every delivery agent believed evidence-based IPEPs should be used by football players, that these programmes should be progressed over time and that muscle strengthening can prevent injuries. Regarding the FIFA 11+ specifically, about 60% were aware of the programme but only half of these reported using it, of which the vast majority indicated they had modified the programme. Everyone using FIFA 11+ with their team seemed to have a positive attitude towards the programme. For IPEPs in general, facilitators and barriers to maintenance of programme delivery at the team staff level were (among other factors) whether there was or was not enough acceptance from other staff, knowledge and motivation and planning and organisation (O'Brien & Finch, 2016).

In an observational study of the same teams, O'Brien et al. (2017b) reported that the delivery agents' main reason for modifying the components of "FIFA 11+" were that they believed this added wanted variation, progression and individualisation, better aligned the IPEP to other training methods and goals. O'Brien et al. (2017b) concluded that although professional football teams use programmes similar to the evidence-based practice such as FIFA 11+, they tailor them considerably to fit in with their specific implementation context.

McCall et al. (2014) has investigated perceptions regarding IPEPs among team staff in 44 professional football teams in different countries. Staff from all teams stated that IPEPs were of benefit and all teams answered to say that they use such programmes, in which most teams had tailored the programmes to suit their players. The team staff believed that eccentric strength exercises was the exercise type with highest potential to achieve effective prevention of injuries (McCall et al., 2014). Findings consistent with these perceptions were reported among physicians in national football teams participating in a world cup tournament (McCall, Davison, et al., 2015).

In a recent Delphi survey, McCall et al. (2020) investigated perceptions about exercise-based strategies to prevent muscle injuries in elite football players among 21 practitioners primarily responsible for preventative training in 18 of Europa's highest ranked football teams. A Delphi survey is a practical and structured scientific method with the purpose of achieving consensus among a group of experts on any given topic. The survey process led to a consensus on the belief that eccentric exercises are the next most effective strategy after sprinting and high-speed running. McCall et al. (2020) further describes a lack of scientific evidence regarding the optimal scheduling and timing for eccentric exercises. Nevertheless, a consensus was established on the belief that the optimal day for delivery depended on the proximity of previous and upcoming matches and that eccentric exercises could be performed either before or after other regular training, depending on the context. Attitudes beliefs about the implementation of the "Adductor Strengthening Programme" have been investigated among football players participating in the original intervention study. Here, Harøy, Wiger, et al. (2019) reported that almost two thirds of players in the intervention group believed they would carry on using the programme the following season, but over 50% believed they would perform the programme less frequently than recommended.

2.10 Methodological theory

When conducting scientific research, it is usual to choose either a quantitative or a qualitative research method. The former research method is often used explore and explain *how* a phenomenon of interest varies between people in target group, through collection and analyses of quantitative data in terms of numbers. This has the potential to describe trends, generate hypotheses for future research, and describe correlation and causal relationships. The latter research method on the other hand is usually used to gain a deeper understanding of *why* the phenomenon of interest varies between people in the target group, through collection and analyses of qualitative data in terms of words. This has the potential to describe nuances more in dept, such as the underlying reasons to different opinions and behaviour. On a scientific research continuum, one may seek to establish quantifiable knowledge about a given phenomenon, before understanding the underlying reasons to why the phenomenon is the way it is. An important consideration when choosing research method is also the resources one has available. This is because quantitative research is considered to demand more resources per included participant. Here, interviews of participants, transcription of interviews into words and relevant

analyses, are time-consuming processes limiting the possible number of participants. Therefore, quantitative research is more useful if the aim is to investigate a somewhat larger sample. (Johannesen, Tufte, & Christoffersen, 2010). In relation to this master project's research aim, a quantitative method with a cross-sectional study design using survey with a questionnaire is considered useful. This is in terms of its ability to gain knowledge of the quantity of different attitudes and beliefs and how much weight different arguments are given, and the practicability. An important limitation with this method and design that one should be aware of however, is that no conclusion about correlation and causal relationships can be drawn.

2.11 Summary

Football is the most popular sport both worldwide and in Norway. Unfortunately, injuries are common in football, and especially male elite football has high injury rates, which is associated with a great burdens and negative consequences affecting both players and teams. Groin injuries specifically represents a considerable problem, considering that groin injuries accounts for 4-19% of all time-loss injuries and the high weekly prevalence where 32% of players complain about any groin problem. To date, the recent "Adductor Strengthening Programme" is the only groin specific IPEP that has demonstrated a significant reduction in the prevalence and risk of groin problems. The "Adductor Strengthening Programme" is therefore recommended to be implemented as part of football training. A crucial step however, when aiming to achieve successful implementation of IPEPs in the real-world context outside controlled intervention studies, is to understand the implementation context. This includes, among others, to quantify attitudes and beliefs among team staff regarding the given IPEP, as attitudes and beliefs affects the implementation process. The RE-AIM framework has been presented as a vital tool for such investigations and is recommended to be used for investigations across all levels of the sports delivery hierarchy. The RE-AIM framework has previously been used to investigate male football players' attitudes and beliefs regarding the "Adductor Strengthening Programme". However, similar investigations have not yet been performed among primary delivery agents in male football, which include the team staff with the main responsibility for injury preventative training in football teams. This, in addition to investigating what is considered as a "best practice" application of the "Adductor Strengthening Programme", is thus the scope of this master project.

3. Methods

3.1 *Design and participants*

This master project is a descriptive cross-sectional study. Included participants were the primary delivery agents of preventative training in all football teams (n=32) in the Norwegian Eliteserien (Premier League) and in the OBOS-ligaen (First Division) in the 2020 season. To obtain responses from the participants within a wide geographical area, we used a questionnaire survey method for data collection.

3.2 *Questionnaire*

3.2.1 *Questionnaire development*

We collected data using a novel questionnaire. It was directed towards the different dimensions of the RE-AIM framework, inspired from previous questionnaires used in studies investigating the implementation of the “Adductor Strengthening Programme” among semi-professional football teams (Harøy, Clarsen, et al., 2019; Harøy, Wiger, et al., 2019) and of the “Oslo Sports Trauma Research Centre (OSTRC) Shoulder Injury Prevention Programme” among elite handball teams (Andersson, Bahr, Clarsen, & Myklebust, 2017; Andersson et al., 2019).

The questionnaire was developed and written in Norwegian (**appendix 1**) and then translated into English (**appendix 2**) for the purpose of this master thesis and a subsequent publication. We only distributed the Norwegian version of the questionnaire. It consisted of 38 questions in total, primarily closed but with a few open-ended questions. Of the open-ended questions, only one was mandatory to continue with the questionnaire. We attached a detailed description of the “Adductor Strengthening Programme” including the evidence-based programme protocol, to the introduction section of the questionnaire (**appendix 3**).

The questionnaire was designed and distributed using the online survey software SurveyXact (Rambøll Management Consulting, Oslo, Norway). It was intended to be compatible with computers, mobile phones and tablets and SurveyXact made it possible to monitor each participant’s progress in completing the questionnaire throughout the data collection period.

3.2.2 Pilot study

Prior to data collection, a pilot study was conducted in July 2020. The primary objective was to ensure that questions and pre-defined response options were precise and well defined for the purpose of this master thesis' research question. The secondary objectives were first to safeguard readability and understanding of the questions, and second, to test the user-friendliness using SurveyXact.

We recruited three experienced delivery agents (two physiotherapists and one strength and conditioning coach) who were experienced with delivery of preventative training in football teams to participate in the pilot testing. None of the respondents were involved in the subsequent data collection. Overall, the pilot study participants were satisfied with the outline of the questionnaire. However, they suggested re-structuring three questions on whether the “Adductor Strengthening Programme” can affect the burden of: (1) Groin problems in general; (2) Adductor related groin problems; (3) Other hip and groin problems. These were included in a question on whether the programme can affect the burden of groin problems. We asked a biostatistician at The Norwegian School of Sport Sciences (NIH) to review the questionnaire to ensure the closed questions could be suitably analysed. The analysability was proven to be satisfactory.

3.3 Data collection

Data collection was conducted over a period of six weeks from the 2nd September to 14th October 2020. We collected detailed contact information; email addresses and mobile phone numbers from the delivery agent in each participating team either through a network of contacts or through contacting to the club using the phone number available on the club's web site. Each delivery agent received an email with information about the master project and the survey, also including an online link to the questionnaire. To get access to the survey, the participants first had to approve the informed consent form (**appendix 4**). To optimise the number of respondents, hence compliance, we choose to conduct the survey during a longer seasonal break, reaching out to the participants in a period of a likely lower workload and less traveling with the team. We sent weekly reminders to non-responders. Also, we sent the first four reminders by email, whereas the fifth reminder was made by an individual phone call. The first-time distribution of the survey and the weekly reminders were sent every Wednesday in the evening, attempting to avoid participants being disturbed during regular working hours.

3.4 Analysis

Statistical analysis of closed-ended responses was conducted with the “Statistical Package for Social Science” (IBM SPSS Statistics for Windows, V. 24.0. Armonk, NY: IBM Corp.). Our data consisted of categorical nominal variables, which are presented as frequency tables and bar charts with numbers and percentages. All decimal values were rounded off to the nearest whole number. Tables were produced by Microsoft Word for Mac (Microsoft V. 16.43) and figures were produced by Microsoft Excel for Mac (Microsoft V. 16.43). We used open-ended text responses to analyse patterns to further substantiate or understanding closed-ended responses by using a quantitative content analysis. Non-completed questionnaire responses were excluded from the analysis.

3.5 Ethics

Approval from the local ethics committee at NIH (**appendix 5**) was received on 13th June 2020 and from the Norwegian Centre for Research Data (NSD) (**appendix 6**) was 8th June 2020, both prior to data collection. A written informed consent form (**appendix 4**) was attached to the survey on the first page after the introduction and had to be approved online by each participant before getting access to the remaining questionnaire. Storage of data was done using a secure database at NIH following NIH’s security requirements of storage of ongoing research data. Personal data was stored and anonymised and research data and identifying personal information was stored separately.

4. Results

We present the results consistent with the dimensions in the RE-AIM framework. Of the 32 delivery agents receiving the questionnaire, 29 (91%) fully completed the survey. One participant partly completed the questionnaire, which was not included in the analysis. The two non-responders and the participant partly completing the questionnaire were one head coach and two physiotherapists. One of the physiotherapists was not familiar with Norwegian.

4.1 Participants

4.1.1 Delivery agents' background information

All respondents were between 18-45 years of age, six (21%) and 23 (79%) respondents were between 18-30 and 31-45 years of age, respectively. Regarding the team's level of play, 14 (48%) respondents worked in teams playing in Eliteserien while 15 (52%) worked in teams playing in OBOS-ligaen. Furthermore, respondents had many years of experience as primary delivery agents in preventative training for football players e.g., more than one-third of the respondents had at least 10 years of experience (**table 3**).

Table 3: Years of experience as delivery agents of preventative training in football

Years of experience	n (%)
0-4	4 (14%)
5-9	14 (48%)
10-14	7 (24%)
15-20	3 (10%)
>20	1 (3%)

4.1.2 Delivery agents' team staff role, education and coaching license

Regarding the team staff role, 23 (79%) delivery agents had a defined formal role as physiotherapists and 5 (17%) as strength and conditioning coaches. One delivery agent had a defined role as a naprapath. None of the participants had a role as head coach, assistant coach, or team physician. Delivery agents' education and coaching licenses are described below (**table 4**). Among the respondents, nine (31%) had a combination of degrees in sports and as a health profession and/or had a coaching license.

Table 4: Participant’s education in sports, health profession and coaching license.

	n (%)
Education	
One-year study in sport sciences	6 (21%)
Bachelor’s degree in sport sciences	3 (10%)
Master’s degree in sport sciences	0 (0%)
Total with education in sport sciences	9 (31%)
Bachelor’s degree in a health profession	23 (79%)
Master’s degree in a health profession	4 (14%)
Total with education in a health profession	27 (93%)
Coaching license	
UEFA B License	2 (7%)
UEFA A License	1 (3%)
UEFA PRO License	0 (0%)
Total with coaching license	3 (10%)

4.2 Reach

4.2.1 Risk of groin problems and importance of preventative training

Only one delivery agent considered football players to have a low risk of getting groin problems, while the remaining 28 (97%) respondents considered the risk as moderate to high. A majority of 27 (93%) respondents perceived it as very important to implement preventative training to mitigate groin problems in football players (**table 5**)

Table 5: Delivery agents’ attitudes and beliefs regarding the players’ risk of getting groin problems, and regarding the importance of mitigating groin problems.

How much risk do you think football players have getting groin problems?				
High risk n (%)	Medium risk n (%)	Low risk n (%)	No risk n (%)	Don’t know n (%)
19 (66%)	9 (31%)	1 (3%)	0 (0%)	0 (0%)
How important do you think it is to perform preventative training to mitigate groin problems?				
Very important n (%)	Medium important n (%)	A little important n (%)	Not important n (%)	Don’t know n (%)
27 (93%)	2 (7%)	0 (0%)	0 (0%)	0 (0%)

4.2.2 Knowledge about the adductor programme and/or the exercise

All 29 (100%) participants were aware of one or both of the “Adductor Strengthening Programme” and “Copenhagen Adduction” before participating in the survey. A wide range of sources of information about the adductor programme and the exercises were reported, with sports medicine conferences or courses being the most common as confirmed by 24 (83%) replies from respondents as one of their sources of information prior to participating in the survey (**figure 4**). Distribution of sources of information that participants were aware of can be seen in **figure 5** below.

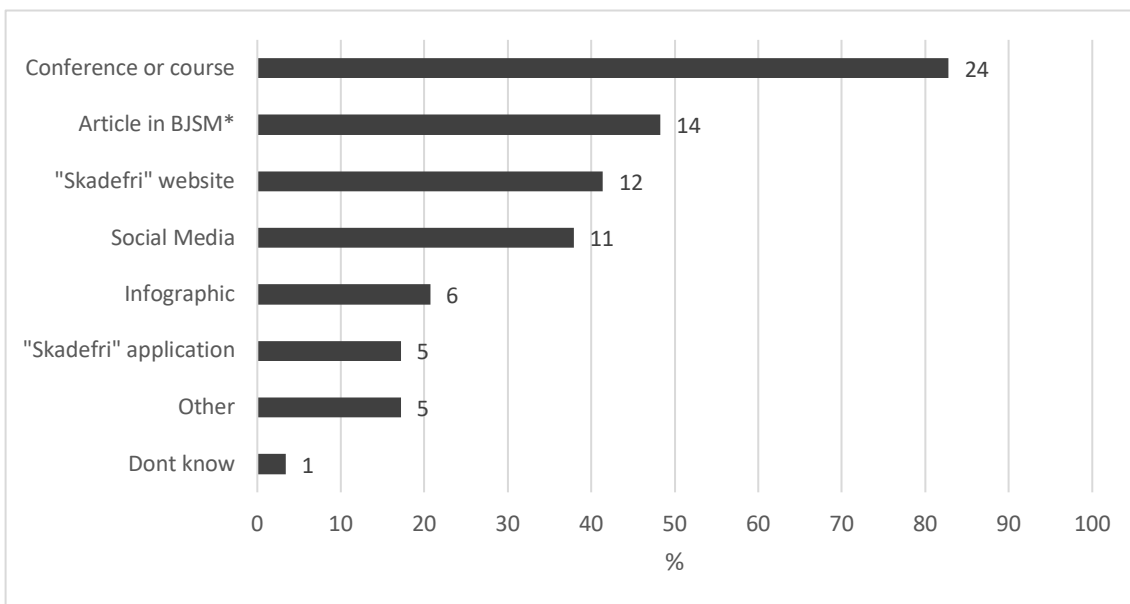


Figure 4: The respondents' sources of information about the “Adductor Strengthening Programme” and/or “Copenhagen Adduction” prior to participating in the survey. It was possible to check several options. *British Journal of Sports Medicine.

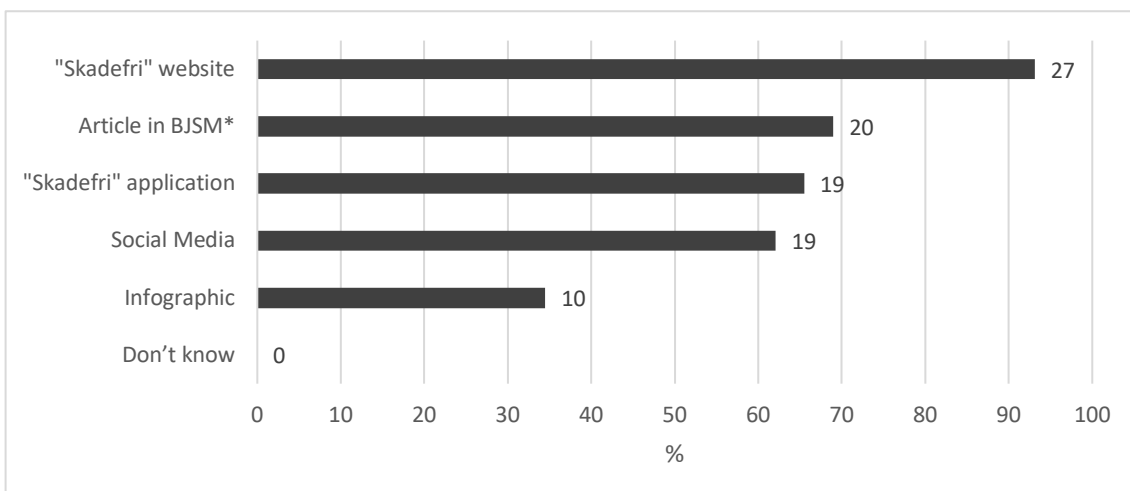


Figure 5: Sources of information about the “Adductor Strengthening Programme” and/or “Copenhagen Adduction” that the respondents are aware of. It was possible to check several options.

4.3 Effectiveness

4.3.1 Perceived effect on groin problems and football performance

All respondent believed the “Adductor Strengthening Programme” as mitigating the burden of groin problems, with 11 (38%) and 18 (62%) respondents replying that the programme is greatly and moderately able to reduce the number of groin problems, respectively. Regarding the effect on football performance, a majority of 26 (90%) respondents considered the programme to either greatly or moderately increase the players' football performance. Answers in terms of effect on groin problems and football performance can be seen in **table 6**.

Table 6: Attitudes and beliefs about whether the “Adductor Strengthening Programme” can influence the burden of groin problems and football performance.

	n (%)
Do you think that the “Adductor Strengthening Programme” can influence the burden of groin problems?	
Yes, it can greatly mitigate	11 (38%)
Yes, it can moderately mitigate	18 (62%)
No, it cannot have an effect	0 (0%)
Yes, it can moderately aggravate	0 (0%)
Yes, it can greatly aggravate	0 (0%)
Don't know	0 (0%)
Do you think that the “Adductor Strengthening Programme” can influence football performance?	
Yes, it can greatly increase	4 (14%)
Yes, it can moderately increase	22 (76%)
No, it cannot have an effect	1 (3%)
Yes, it can moderately decrease	0 (0%)
Yes, it can greatly decrease	0 (0%)
Don't know	2 (7%)

4.3.2 Perceived effect on physical parameters, player availability and chance of winning

More than two thirds of the participants perceived that performing the “Adductor Strengthening Programme” could either largely or somewhat improve the players’ ability regarding directional changes and their duelling power, while linear acceleration was thought to be either largely or somewhat improved by nearly 50%. Meanwhile, less than one-third thought that performing the programme had any effect on top speed and on vertical jump ability (**figure 6**).

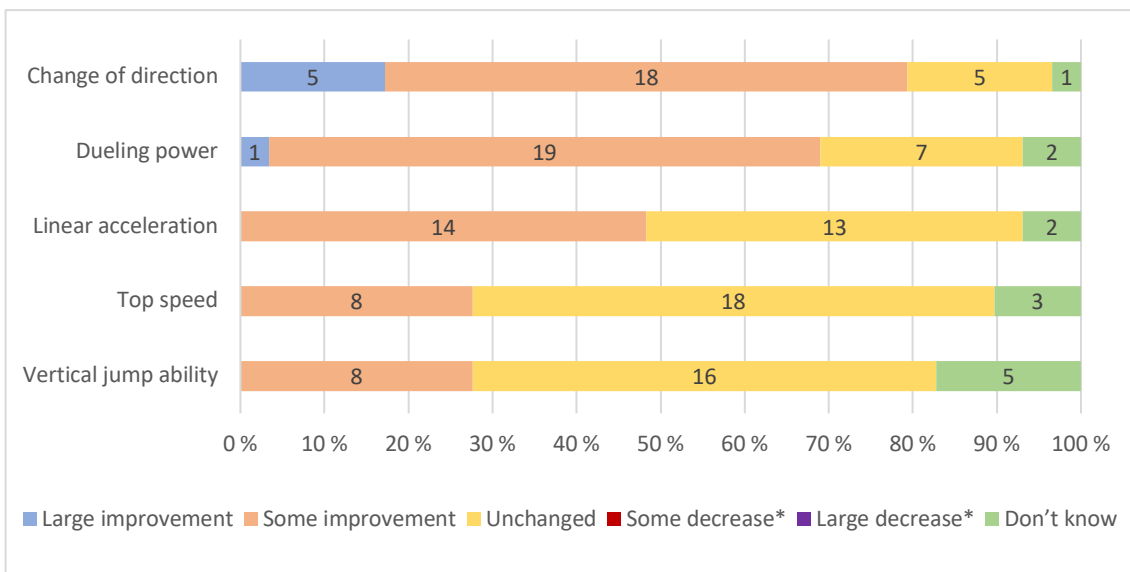


Figure 6: Respondents’ replies to the following question: “How do you think the following physical parameters of players may be affected by doing the “Adductor Strengthening Programme”?”. *No respondent replied some decrease or large decrease.

The availability of players for matches was regarded by all (100%) delivery agents to be increased and the availability of players in training was believed by 28 (97%) to be increased by performing the “Adductor Strengthening Programme”. Concerning the chance of winning, more than 50% of the respondents believed that the “Adductor Strengthening Programme” would increase the chance of winning matches. For further details regarding player availability and chances of winning a match, see **figure 7** below.

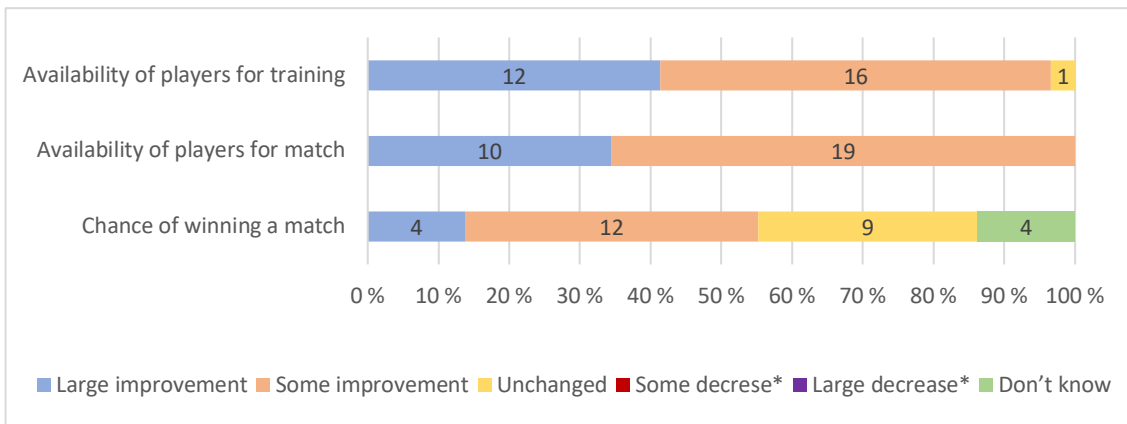


Figure 7: Respondent’s replies on the following question: “How do you think other factors may be effected by doing the “Adductor Strengthening Programme”?”. *No respondent replied some decrease or large decrease.

4.3.3 Other consequences regarding the programme’s effectiveness

In an open-ended question about other positive effects and consequences from using the “Adductor Strengthening Programme”, the most frequent belief, stated by four (27%) of the 15 delivery agents answering the question was that the programme has an indirect performance-enhancing effect. Hence, being able to mitigate the burden of groin injuries resulting in increased participation in training and matches. For example, one respondent replied “Less injuries leads to increased participation in training, which leads to increased performance. Everything is connected with the preventive effect of the programme. My experience ... is that the programme a little pure "performance-enhancing" effect” (authors’ translation) (**appendix 7**). A similar open-ended question regarding negative effects and consequences from using the adductor programme, an issue with the programme being too progressive for some players was the most frequent belief, as shown by the replies of five (31%) of the 16 delivery agents responding to the question. For example, one respondent replied, “There were challenging with the dosage of the programme for unfit players, especially when players are going into a busy football cycle parallel to introducing specific groin training programmes” (authors’ translation) (**appendix 7**). Additionally, muscular soreness was confirmed by four (25%) delivery agents as a negative effect. Of these respondents, two (13%) did recommended performing the programme after rather than before football training sessions. All open-ended replies about other positive and negative effects and consequences from performing the programme can be viewed in **appendix 7**.

4.4 Adoption

All delivery agents stated that they had implemented the “Adductor Strengthening Programme” in their team, of which three (10%) replied that the use of the programme was in accordance with the full protocol. The programme was used as part of specific organised strength training by 11 (38%) respondents, hence being the delivery setting where most respondents incorporated the programme. All other examined settings were also used by at least one participant. A full overview of the entire replies regarding the settings where the adductor programme was performed can be seen below (**figure 8**).

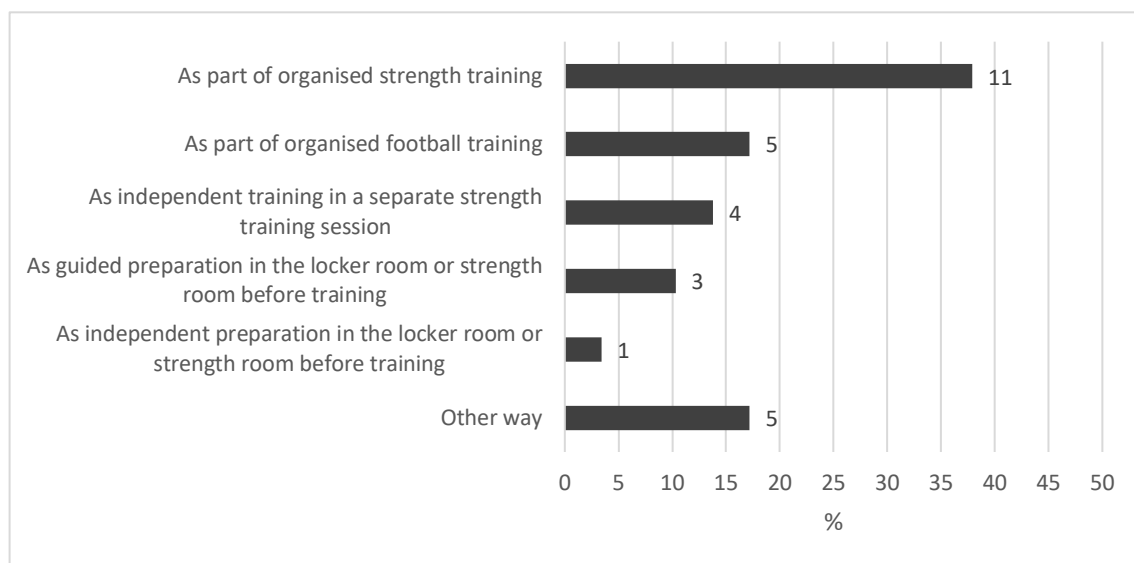


Figure 8: Participants’ responses to the following question: “How do you use the “Adductor Strengthening Programme” in your training schedule?”.

4.5 Implementation

4.5.1 “Adductor Strengthening Programme” dosage preseason

During the preseason, the participants used a wide range of frequency of sets and repetitions. The frequency most often used was twice a week by 16 (55%) respondents. Regarding sets per side in each session, a majority, 17 (59%), of respondents used two sets while eight (28%) used more than two sets per side. In terms of the number of repetitions, 16 (55%) respondents used 7-10 repetitions in each set, while eight (28%) used a progressive number of repetitions in the sets. Among the respondents using a progressive number of repetitions, three (10%) used it as per the protocol and five (17%) used a modification of the protocol (**table 6**).

Table 7: “Adductor Strengthening Programme” dosage in preseason*.

	n (%)
Frequency: “How often did the players perform the programme?”	
More than 3 times a week	2 (7%)
3 times a week	4 (14%)
Twice a week	16 (55%)
Once a week	5 (17%)
We carried out the program, but less than once a week	2 (7%)
Sets: “How many sets did the players perform?”	
More than 2 sets per side	8 (28%)
2 sets per side	17 (59%)
1 set per side	4 (14%)
Repetitions: “How many repetitions did the players perform in each set?”	
More than 15 repetitions each week	1 (3%)
12-15 repetitions each week	3 (10%)
7-10 repetitions each week	16 (55%)
3-5 repetitions each week	1 (3%)
3-15 repetitions, weekly progressive as in protocol	3 (10%)
3-15 repetitions, weekly progressive as own modification	5 (17%)

* specified as under normal circumstances, e.g., not influenced by Covid-19

4.5.2 “Adductor Strengthening Programme” dosage in-season

During the competitive season, nine (31%) teams used the “Adductor Strengthening Programme” more than once a week, whilst 16 (55%) respondents used the programme once a week. Nearly two-thirds, with 18 (62%), of respondents used two sets per side in each session. Regarding the number of repetitions used, 14 (48%) respondents replied that 8-11 repetitions were done, while six (21%) reported 12-15 repetitions and 8 (28%) reported 4-7 repetitions being used (**table 7**).

Table 8: “Adductor Strengthening Programme” dosage in-season.

	n (%)
Frequency: “How often did the players perform the programme?”	
More than once a week	9 (31%)
Once a week	16 (55%)
Once every two weeks	2 (7%)
We carried out the program, but less than once every two weeks	2 (7%)
Sets: “How many sets did the players perform?”	
More than 2 sets per side	7 (24%)
2 sets per side	18 (62%)
1 set per side	4 (14%)
Repetitions: “How many repetitions did the players perform in each set?”	
More than 15 repetitions	1 (3%)
12-15 repetitions	6 (21%)
8-11 repetitions	14 (48%)
4-7 repetitions	8 (28%)
Less than 4 repetitions	0 (0%)

4.5.3 Reasons for using the “Adductor Strengthening Programme”

The evidence-based injury preventative effect of the “Adductor Strengthening Programme” was viewed by all 29 respondents as being overly important for choosing to implement it. Furthermore, no requirement for additional exercise equipment was perceived as important by over half of the delivery agents. More than 20% replied they found it important that the programme consisted of one exercise only and that the programme had different progression levels (**figure 9**).

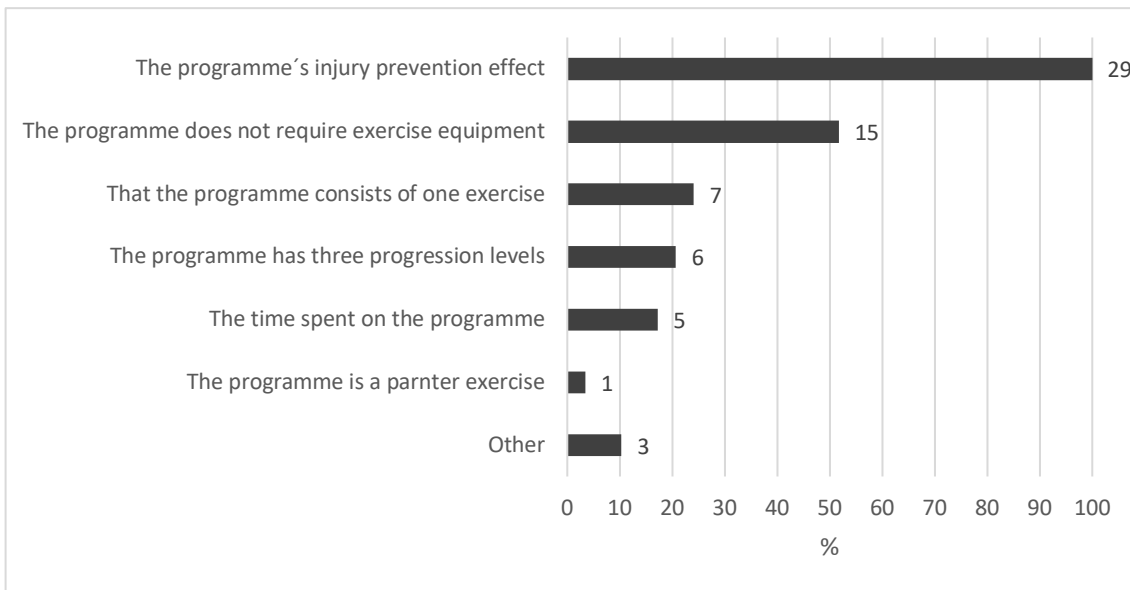


Figure 9: Responses to the following question: “What has been important for you in choosing to use the “Adductor Strengthening Programme”? It is possible to check several options”.

4.5.4 Other groin injury prevention training

Preventative exercises, with the intention of mitigating the burden of groin problems, other than the “Adductor Strengthening Programme” was used by 24 (83%) delivery agents, while four (14%) did not use other training exercises than the programme. In an open-ended question asking which other exercise types in addition to the “Adductor Strengthening Programme” delivery agents used to mitigate groin injuries among players, 20 (69%) participants stated that they used different types of strength exercises. This was the most frequently used additional exercise type, followed by dynamic mobility exercises and functional training (**table 9**). All responses on the open-ended question about additional exercises can be seen in **appendix 7**.

Table 9: Types of exercises stated as used by delivery agents to prevent groin injuries in players in addition to the “Adductor Strengthening Programme” (open-ended question)

Exercise type	n (%)
Strength*	20 (69%)
Dynamic mobility	8 (28%)
Functional training (movements and strength)	4 (14%)
Balance/proprioception	2 (7%)
Plyometric	2 (7%)
Sprinting/running	2 (7%)
Yoga	1 (3%)

* including eccentric and concentric lower limb exercises and core exercises.

4.5.5 Decision-making process regarding programme implementation

In an open-ended question asking about the decision-making process of implementing preventative training to mitigate groin problems, only two (9%) of the 22 delivery agents replying to the question described shared decision-making, which also included the players. Remaining respondents described either a decision taken only by the primary delivery agent of preventative training or a decision-making process involving the delivery agent together with the coaches and/or the medical team.

4.6 Maintenance

The “Adductor Strengthening Programme” was anticipated by 28 (97%) of the delivery agents to be used in the following season, of which 8 (28%) respondents planned to use it in accordance with the programme’s protocol. One respondent did not know whether the programme would be used in the following season.

Among the respondents anticipating using the “Adductor Strengthening Programme” in the next season, all 28 replied that an important reason for doing this is the injury preventative effect of the programme. Other reasons given for continuing with the programme were evenly distributed, e.g., that the programme does not require additional equipment, which was noted as an important reason by more than 40%. Time spent conducting the programme, the fact that it consists of solely one exercise with different progression levels and that it can be performed without a partner were viewed as being significant by over 20% (**figure 10**).

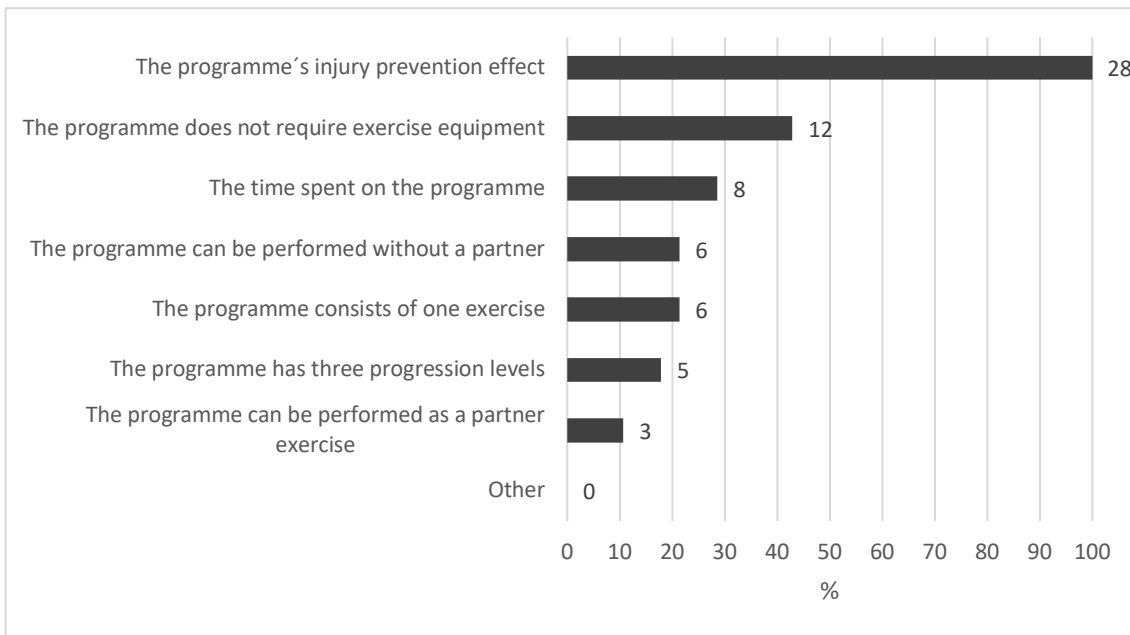


Figure 10: Responses to the following question: “What are the reasons why you anticipate using the “Adductor Strengthening Programme” in your team the following season? It is possible to check several options”.

4.7 Suggestions for changes to the “Adductor Strengthening Programme”

One open-ended question asked the participants for their suggestions for changes of the “Adductor Strengthening Programme” to make it more applicable in a football team setting. All replies can be found in **appendix 7**. Among the 11 delivery agents replying to this question, two (18%) thought that the full programme protocol could accumulate too high a total load and/or too high a progression especially when other preventative training is progressed simultaneously. This could subsequently possibly increase the risk of injury. Two (18%) respondents suggested the need for additional progression levels, including a new lower level for the programme in a standing starting position and also adding a more difficult higher level with external loading to the programme (**appendix 7**).

5. Discussion

The aims of this master thesis were first, to examine attitudes and beliefs regarding the “Adductor Strengthening Programme” among delivery agents of preventative training in Norwegian male elite football teams. Second, to identify a “best practice” application of the “Adductor Strengthening Programme”. The following contains a discussion of the results and the methods. As in the previous chapter the discussion will be presented consistent with the RE-AIM dimensions.

5.1 Response rate and respondent’s formal role

The primary delivery agent in 91% of the 32 Norwegian male elite football teams completed the survey. This response rate is in line with previous studies of comparable size on attitudes and beliefs among technical and medical staff in elite football teams (McCall, Davison, et al., 2015; McCall et al., 2016; O'Brien & Finch, 2016), but significantly higher than the response rate (47-75%) observed in two studies with considerably larger sample sizes (Al Attar et al., 2018; McCall et al., 2014). Although a certain number of non-responding participants can be expected, surveys must aim to have the highest possible response rate, and rates above 80% are considered as high (Johannesen et al., 2010). Among our respondents had 79% a defined formal role as their team’s physiotherapist. This contrasts with the comparable studies, as both McCall et al. (2014) and O'Brien et al. (2017a), who surveyed delivery agents specifically, included primarily strength and conditioning coaches and head coaches. Other studies surveyed medical doctors (McCall, Davison, et al., 2015; McCall et al., 2016) and coaches (Al Attar et al., 2018), without detailed specifying which team staff member responsible for the IPEP delivery. A detailed discussion of the participants and how their formal team staff role may influence the results is found under the section of methodological considerations.

5.2 Reach

5.2.1 Groin injury risk and importance of preventative training

Knowledge about the extent of sports injury problems including the risk of getting a given sports injury is considered as a crucial step in the process of mitigating any injury burden (Finch, 2006). It is also stated that delivery agent’s knowledge about injury risks and beliefs of preventative training as important are essential to facilitate IPEP

implementation in the real-world context (Ageberg, Bunke, Lucander, Nilsen, & Donaldson, 2019; Richmond et al., 2020). Our study demonstrates that the vast majority of the delivery agents in Norwegian male elite football believe players to be at medium or high risk of getting a groin problem, and a in near full agreement that preventative training is uttermost important. This is in line with the only other study reporting on this outcome where O'Brien and Finch (2016) found that 89-100% of respondents perceived youth elite players to be highly susceptible to lower limb injuries, and supported by all participants that preventative training being important.

Moreover, the delivery agents' beliefs regarding the risk of getting a groin injury is in line with epidemiological data showing a high weekly prevalence of groin problems in male players (Harøy, Clarsen, et al., 2017; López-Valenciano et al., 2020). The justification of this belief is further supported in recent studies showing that football is among the sports with the highest groin injury risk and groin injuries are one of the injuries most often leading to time-loss and elite players are at higher risk than amateurs, and males are more prone to groin injuries than women (Klein et al., 2018; López-Valenciano et al., 2020; Orchard, 2015). The somewhat inconsistent terminology in which groin injuries and groin problems are described in parallel poses a methodological challenge when results in different studies are compared. This is discussed in more detail in the section of methodological considerations.

5.2.2 “Adductor Strengthening Programme” awareness

Interestingly, all respondents in our study were aware of the “Adductor Strengthening Programme” and/or the “Copenhagen Adduction” prior to our survey. As reach concerns whether a targeted population knows about a given intervention (Forman et al., 2017), it is safe to say that the adductor programme reach is high among primary delivery agents in Norwegian male elite football teams. This is important, as even the most potent programme will have low real-world impact if delivery agents are not aware of them (Donaldson, Gabbe, Lloyd, Cook, & Finch, 2019; Forman et al., 2017; O'Brien et al., 2018), although high programme awareness and intent to use such a programme not necessarily are translated into effective IPEP implementation (Frank, Register-Mihalik, & Padua, 2015).

In comparison to previous studies, reach in terms of awareness of the “Adductor Strengthening Programme” is higher in the present study than awareness of other specific IPEPs. The single previous study including delivery agents in elite teams found 61% to be aware of the “FIFA 11+” (O'Brien & Finch, 2016), whereas 80% and 90% of coaches in amateur football were aware of the “FIFA 11+” and “Knee Control”, respectively, after large implementation campaigns (Junge et al., 2011; Lindblom et al., 2014). Junge et al. (2011) called the campaign which led to about 80% being aware of the given IPEP, as successful. Moreover, this study is another example that awareness not necessarily translates into effective implementation as only half of the respondents stated they complied to the “FIFA 11+” either fully or partly. It should, however, be emphasised that the sample size in the present study is significantly smaller compared to the latter two studies.

There are likely several reasons why all delivery agents in Norwegian male elite football were aware of the “Adductor Strengthening Programme”. One reason can be that the original intervention study was conducted in Norway among Norwegian male elite and sub elite teams. This may have led to a “word of mouth” effect in the elite football community in Norway. Also, it may reflect increased focus on IPEPs in recent years, which is not specific to groin injuries alone (Brunner et al., 2019; Emery et al., 2015; Herman et al., 2012; Hübscher et al., 2010; Lauersen et al., 2014). Nevertheless, that all respondents were aware of the “Adductor Strengthening Programme” implies that the relevant communication strategies to enhance programme awareness have been successful.

5.3 Effectiveness

Beliefs that the effects of a programme will lead to a desired outcome, is an important facilitator to successful implementation of any programme. This may first and foremost apply to an IPEP’s effect on injury prevention (Lindblom et al., 2018), which lies in the true essence of the term injury prevention exercise programme. The overall goal in football is nevertheless about performance, and IPEP's effects on performance are considered key facilitators to programme implementation, also (Richmond et al., 2020; Shamlaye et al., 2020). Our results demonstrate that delivery agents in Norwegian male elite football teams believe that the “Adductor Strengthening Programme” has an injury preventative effect, 32% and 68% perceiving it as greatly and moderately mitigating the

burden of groin problems, respectively. Our findings regarding the perceived programme effectiveness is even more dominant than the perceived injury preventative effects in other studies investigating the “FIFA 11+” (O'Brien & Finch, 2016; Shamlaye et al., 2020) and “Knee Control” (Lindblom et al., 2014). Moreover, our results are in line with findings by McCall et al. (2014) and O'Brien and Finch (2016), where delivery agents in professional football thought eccentric exercises in general as able to prevent lower limb injuries. To properly estimate if the 41% lower risk of reporting groin problems associated with the “Adductor Strengthening Programme” is a moderate or great effect, would need standardised statistical analysis of the effect size (Lydersen, 2020). This is outside the scope of this master thesis. However, when comparing demonstrated injury preventative effects, the adductor programme seems a little less effective than “Knee Control” and “Nordic Hamstring” (Arnason et al., 2008; Waldén et al., 2012). On the other hand, a systematic review by Thorborg et al. (2017) described the “FIFA 11+” to have a substantial injury preventative effect, when they calculated this programme to have an injury preventative effect on groin injuries similar to the “Adductor Strengthening Programme”. Also, the IPEP investigated by Hölmich et al. (2010) who demonstrated positive impact on groin injury rates, was nevertheless showed to have a non-significant effect. Thus, it seems reasonable to say that the adductor programme greatly mitigates the burden of groin problems, although direct comparisons should be made with caution due to methodological differences.

In relation to football performance the vast majority (76%) of participants believe that the programme moderately can increase performance whereas 14% believed in a great increase in performance. This is in line with the single previous study reporting on this outcome, as Lindblom et al. (2014) found most participants to perceive “Knee Control” as performance enhancing. The term “football performance” is a broad concept requiring complex physical, technical, tactical and mental skills (Coutts, 2016; Salmon & McLean, 2020). Perceptions of overall football performance are thus dependent on numerous variables and may also be understood as for example final domestic league ranking and tournament success, making evaluation of such performance challenging. The lack of an operational definition of this term is a limitation to our study, as unspecific questions with potentially reduced degree of common understanding are prone to an information bias. This is a bias where a questionnaire is constructed in a way that the results may not reflect a picture that is fully true (Johannesen et al., 2010).

Whether a possible increase in football performance happens as a direct or indirect consequence from the “Adductor Strengthening Programme” has not been studied. However, answers on an open-ended question asking about positive consequences of the programme can give some relevant insight to this topic. Interestingly, 27% of the open-text answers were categorised as a belief favouring that the adductor programme has an indirect effect on football performance. These answers described a chain reaction where the adductor programme first and foremost reduced the groin injury rates, leading to increased participation in football training which then ultimately led to improved performance. This corresponds to the general belief that large amounts of training and practice are needed to develop and sustaining elite performance, introduced by Ericsson, Krampe, and Tesch-Römer (1993). Beliefs that an increase in football performance lies in the mitigation of injuries leading to increased participation is also consistent with general sports training principles, especially in terms of specificity and continuity (Raastad, Paulsen, Refsnes, Rønnestad, & Wisnes, 2010). You first and foremost become good at what you are training and practising for, and you need to achieve a large enough amount of specific training to achieve this (Kasper, 2019). These principles also apply in football (Morgans, Orme, Anderson, & Drust, 2014).

Interestingly, the vast majority of the delivery agents agree that by implementing the “Adductor Strengthening Programme” can increase the availability of players in training and match play. This indicates a belief in favour of an indirect performance enhancing effect, as increased availability implies increased participation among players. Such increased participation may to at least some extent be associated with development and maintenance of elite performance, although these conditions are very complex where more does not exclusively mean better (Bjørndal, 2020). Moreover, respondent’s belief of increased availability of players due to IPEP’s may explain why they also believed that the “Adductor Strengthening Programme” either moderately or largely improves the chance of winning matches.

These possible associations are in line with findings by Carling et al. (2015), who observed one professional football team across five consecutive seasons. In the season the team obtained its highest number of points and won the domestic premier league, coincided with the season where the team had its lowest match injury rate, fewest days lost due to injury, and highest number of players available for match. The authors

argued that these observations were associated with a lower squad utilisation, suggesting that the preferred best players often could be picked for match which possibly led to the team's high success that season. Similar findings by Häggglund, Waldén, et al. (2013) and Eirale et al. (2013) supports that injury rates affect number of days lost which further affect player availability, and are associated with team overall performance measured as placement in domestic league and international tournaments. It should be emphasised that the studies mention above all investigated the associations between overall injury rates and performance. Whether the "Adductor Strengthening Programme" has the potential to mitigate enough groin problems to affect overall injury rates positively needs to be investigated and warrant further investigations.

Interestingly, no respondents believed that performing the "Adductor Strengthening Programme" would lead to a decrease in any of the physical parameters that were surveyed. This is important, as a perception of a potential negative effects of preventative measures are described as a key barrier to implementation of IPEPs. However, physical parameters in the present study only represents a part of all physical parameters required for performance in elite football, and whether the physical parameters included in our survey are more important than other, is questionable.

5.4 Adoption

Being aware of an IPEP and believing it having beneficial effects are of significant importance in the implementation process. However, no evidence-based IPEP will achieve any impact beyond the teams participating in controlled trials if football teams in the real-world context do not decide to use the given IPEP. It is therefore highly interesting that all respondents replied that they use the "Adductor Strengthening Programme" in their team. This is higher adoption than what has been reported in previous studies investigating the use of specific IPEPs among elite teams, such as the "FIFA 11+" (Al Attar et al., 2018; O'Brien et al., 2017a) and the "Nordic Hamstring" (Al Attar et al., 2018; Bahr et al., 2015). Despite 88% being aware of the hamstring programme, Bahr et al. (2015) found that among 32 European and 18 Norwegian elite football teams 17% used "Nordic Hamstring" in three consecutive seasons, only. No significant difference between European and Norwegian teams were found. Striking though, is the discrepancies in adoption between the "Adductor Strengthening Programme" and the "Nordic Hamstring" programme in Norwegian teams. Particularly

since, these programmes in addition to sharing methods characteristics (single exercise, performed with partner, no equipment), both studies was pioneered and conducted in Norway showing significant injury preventative effect in a comparable cohort of Norwegian elite footballers.

One aspect that may explain some of the abovementioned differences in programme adoption among Norwegian teams is the six-year difference between our data collection and the data collection by Bahr et al. (2015). This is because efforts to prevent injuries are increasing not only among researchers, but also among practitioners in elite teams (O'Brien & Finch, 2014a). This possible explanation is in line with a recent study who reported that “Nordic Hamstring is used by approximately half of the teams in a sample of professional and semi-professional European football teams (Al Attar, Komir, Alzubeadi, Bukhari, & Ghulam, 2021), which is higher than the adoption reported by Bahr et al. (2015). However, Al Attar et al. (2021) did not survey the same sample as Bahr et al. (2015), and the studies can therefore not be used to draw safe conclusions in terms of whether differences are solely due to the time aspect. Moreover, the pace of change in medical practice is known to be slow (Morris, Wooding, & Grant, 2011). It is therefore uncertain whether the six-year difference is enough to attribute differences in the hamstring exercise and adductor programme adoption among Norwegian teams solely to the time difference. Another aspect is thus that delivery agents in Norwegian teams simply consider the “Adductor Strengthening Programme” to be more beneficial and easier to use than “Nordic Hamstring”, and therefore more often choose to use the former one. However, there is no data to support this potential explanation.

Regarding feasibility, only 10% of the delivery agents we surveyed stated that the players in their team performed the “Adductor Strengthening Programme” in accordance with the programme protocol. This may indicate that strict adherence to the “Adductor Strengthening Programme” context is challenging and likely to be unrealistic in the real-world elite football context. This is, however, not surprising: A recent Delphi consensus study in experienced elite football practitioners revealed that evidence-based preventive protocols in general are difficult to directly apply in practical settings, as each team is perceived to constitute a different delivery context (McCall et al., 2020). Our finding of widespread use of adductor programme modifications is fully in line with other studies on “FIFA 11+” and “Nordic Hamstring” showing extensive use of

IPEP modifications in real-world contexts (Al Attar et al., 2018; Bahr et al., 2015; O'Brien et al., 2017a; Shamlaye et al., 2020).

This touches upon what possibly is the foremost key challenge regarding implementing evidence-based IPEPs in the real-world football context. On the one hand, the IPEP that is to be implemented must be designed so that an injury-preventing effect is ensured, while it on the other hand, also must be designed in a way so that teams outside controlled studies find it reasonable use it and comply with it. In other words, real-world impact will not be achieved by even the most potent IPEP if it is not adopted, nor will adoption of IPEPs that needs such major modifications for teams to comply with it, that the injury prevention effect is deteriorated. However, implementation is not so that black and white that all modifications result in reduced IPEP effectiveness. On the contrary, several studies have demonstrated that modifications of IPEPs aimed at facilitating a higher compliance can improve the programmes injury prevention effect (Al Attar, Soomro, Pappas, Sinclair, & Sanders, 2017; Whalan, Lovell, Steele, & Sampson, 2019). Nevertheless, it is important that teams do not do more modifications to the “Adductor Strengthening Programme” than those that are most necessary to ensure satisfactory compliance. This applies all the time that the programme protocol described by Harøy, Clarsen, et al. (2019) is the only way of performing the “Adductor Strengthening Programme” where a groin injury prevention effect is ensured.

In this regard, it is worth noting that the IPEP implementation process in elite football teams is influenced by much more than only the attitudes and beliefs of delivery agents. For example, internal club factors such as “buy in” from the coaching team generally and the head coach especially, is highly important (McCall et al., 2014). Future research should therefore be aimed at investigating attitudes and beliefs regarding the “Adductor Strengthening Programme among coaches, to establish knowledge about barriers to adoption of an unmodified adductor programme. Future research may also investigate the injury prevention effectiveness of the most widely used adductor programme modifications, in order to sufficiently evaluate alternatives to the evidence-based programme protocol.

5.5 Implementation

The RE-AIM implementation dimension deals with whether delivery agents use the “Adductor Strengthening Programme” correctly, e.g., consistent with the programme protocol. This is discussed partly already in the section above, but an equally important discussion considers how delivery agents in Norwegian male elite football teams use the “Adductor Strengthening Programme” within their team. The following section will therefor discuss adductor programme dosage during preseason and in-season, reasons why they choose to use the programme and additional groin injury prevention exercises that respondents state to use.

5.5.1 “Adductor Strengthening Programme” dosage

Our results demonstrated that a wide range of frequencies, sets and repetitions are being used, when the “Adductor Strengthening Programme” is used in the real-world football context. One major finding was that the players in most cases perform slightly fewer repetitions in each set, but with more sets per side, than what is recommended in the evidence-based adductor programme protocol, while the used frequency usually is in line with the protocol. It thus appears that the total weekly programme volume in most teams in the real-world context is either equal to, or slightly higher than, the total weekly volume that is recommended. This applies especially to in-season where the “Adductor Strengthening Programme” protocol describes a fixed number of 12-15 repetitions. It does however also somewhat apply to preseason, as the same high number of repetitions is recommended in minimum half of the training weeks in the progressive preseason protocol.

None of the previous studies on elite football teams reported how many sets and repetitions that are being used when performing IPEPs. McCall et al. (2014) has described IPEP frequency used by elite teams, but direct comparisons are difficult as they reported in terms of any IPEP, which does not reflect the frequency of specific exercises such as the “Adductor Strengthening Programme”. It should be noted however, that our results demonstrating a lower frequency in-season than preseason, is consistent with the similar trend described by McCall et al. (2014). It is also in line with delivery agents believing that IPEP frequency must be reduced in periods with higher match congestion due to workload considerations, as described by McCall, Carling, et al. (2015) and McCall et al. (2016).

We failed to include a question in the survey about respondents' reasons for modifying the adductor programme. A likely explanation to the reduced number of repetitions in each set, however, is that medical staff and players are concerned of muscle soreness. This is because muscle soreness is experienced and described to be associated with a high training intensity, with sets of strength training being performed to near or total muscular failure, often occurring with a higher number of repetitions per set (American College of Sports Medicine, 2009; DeSimone, 2017). This explanation is supported by replies to the open-ended question asking about negative effects associated with the adductor programme, where 25% of the responses were categorised as related to concerns regarding muscle soreness (**appendix 7**). It is also in line with McCall et al. (2016), where concerns and complaints of muscle soreness was perceived as a barrier to IPEP implementation.

A second possible explanation for the reduction of repetitions in each set may be fear of players being exhausted by the "Adductor Strengthening Programme" prior to football training, as this potentially can reduce performance during football training. However, as less than 20% of the delivery agents replied that they use the programme prior to football training, this argument seems to have limited relevance. A third possible explanation may be that players reach their maximum number of repetitions before the recommended number of repetitions are achieved. In theory, this is possible because regression to an easier level is recommend only in terms of pain, and not when the repetition goal is not achieved. A limitation with both these explanations, however, is that male elite players should be expected to have enough strength to achieve the recommended 12-15 repetitions after the strengthening period, without experiencing performance limiting exertion.

Another major finding is that that less than one-third of the participants implemented a progressive number of repetitions intra set during preseason. Thus, most Norwegian male elite football teams use the "Adductor Strengthening Program" in a way during preseason that is not in line with the evidence-based progressive protocol. This is highly interesting, as the progression aims to facilitate a gradual increase in players adductor muscle strength, described as the only consistently reported groin injury risk factor (Whittaker et al., 2015). Nor is the described preseason practice in line with prevailing strength training recommendations. These do consistently recommend an initial phase

focusing on familiarisation and technique, followed by gradually progression in exercise volume and intensity (American College of Sports Medicine, 2009; Lauersen et al., 2018). Moreover, carefully controlled progression when performing “Copenhagen Adduction”, the exercise that the “Adductor Strengthening Programme” is based on, has been demonstrated to reduce muscle soreness in professional football players (Polglass et al., 2019). This is important, as muscle soreness, as aforementioned, is considered as a key barrier to successful IPEP implementation.

A possible explanation for the mentioned finding may be that players are considered as strong enough to skip the parts of the “Adductor Strengthening Programme” protocol containing the lowest number of repetitions in each set. This may for example be valid if players sustain their hip adductor muscle strength from previous season, into the given preseason. This is considered as more likely to apply for the mostly full-professional elite teams our respondents are affiliated with, in contrast to the sub elite teams included in the “Adductor Strengthening Programme” intervention study by Harøy, Clarsen, et al. (2019) where the programme was introduced. It is also possible that the question regarding number of repetitions during preseason is subject to an information bias: Firstly, it was difficult to make pre-defined response options that were fully consistent with the intra set repetition progression described in the “Adductor Strengthening Programme” protocol. Secondly, it was even more difficult to make options that could reflect all the potential repetition progressions used by teams in the real-world context.

5.5.2 Reasons for using the “Adductor Strengthening Programme”

The question asking about important reasons for choosing to use the “Adductor Strengthening Programme” was intended to highlighting characteristics that facilitates implementation. Interestingly, respondents replied that the perceived evidence-based injury preventative effect was as a key reason to use the programme, thus being an important facilitator to programme implementation. This is in line with results in previous studies asking about the importance of scientifically proven effects of preventative measures (O'Brien & Finch, 2016; Richmond et al., 2020). The second most often reported reason to implement the adductor programme was that the programme does not require exercise equipment, which is also is reason why the exercise that the “Adductor Strengthening Programme” builds on, was developed in the

first place (Sermer et al., 2014). Time spent to perform the “Adductor Strengthening Programme” was the second least perceived important reason for choosing to use the programme. This is interesting as studies has described IPEPs being too time-consuming to be perceived as a barrier to implementation (O'Brien & Finch, 2016; Shamlaye et al., 2020), while the adductor programme is reported to take five minutes or less to complete (Harøy, Wiger, et al., 2019).

5.5.3 Additional groin injury preventative training

The open-ended question asking what other training the delivery agents use to prevent groin injuries in addition to the “Adductor Strengthening Programme”, demonstrated that a wide range of different types of exercises are being used. Such use of several exercises with similar aims is in line with the usual practice in elite football teams (Al Attar et al., 2018; O'Brien et al., 2017b). Why team staff prescribe more exercises than the “Adductor Strengthening Programme” is not known. An explanation may be that the adductor programme is perceived as not functional football specific enough due to the side lying position. This is in line with a general belief among delivery agents that players are less compliant with IPEPs when players do not see the connection between the exercise and football (Shamlaye et al., 2020).

5.6 Maintenance

The final step for any effective IPEP to reach its full injury prevention potential in the real-world context, is to ensure that the IPEP is maintained over multiple seasons. Among the delivery agents in Norwegian male elite football teams participating in our survey, 97% were anticipating that they would continue using the “Adductor Strengthening Programme” the following season. The proportion of team staff anticipating maintaining any IPEP has not been reported in any if the previous studies on elite football teams. This lack of reporting maintenance aspects is an issue across the literature on injury prevention implementation in ball sports (O'Brien & Finch, 2014a). Interestingly however, our results demonstrate a contrast to the general perception that football players experienced with the programme after participating in the adductor program intervention study by (Harøy, Clarsen, et al., 2019). Here, only two thirds of the players thought they would perform the programme the following season, despite nearly all players considering groin injury prevention as at least moderately important (Harøy, Wiger, et al., 2019).

One reason that may at least partly explain the discrepancy is the difference in how the adductor programme performance has been organised. In our study, only 17% of respondents stated that the programme was performed independently by players (outside organised training), whereas the equivalent number was 27% of respondents in the study by Harøy, Wiger, et al. (2019). It seems reasonable to assume that players are less likely to believe that they will maintain any IPEP that is not being performed as organised training. However, an even more likely reason is the differences in type of participants. In our study, we only surveyed delivery agents mostly employed as physiotherapists, whereas Harøy, Wiger, et al. (2019) solely surveyed football players. This is an important aspect due to the aforementioned fact that medical staff such as physiotherapists are to take care of players' health, which typically includes a focus on IPEPs, in contrast to the players who often are focused on performance-enhancing measures (O'Brien et al., 2018).

Reasons for why the delivery agents anticipated to maintain the use of the “Adductor Strengthening Programme” the following season is somewhat in line with the reasons stated as important for choosing to use the programme this season. Interestingly however, a higher number of respondents highlighted the time spent on the programme as a reason to maintain, an aspect which has been discussed in more detail above. A limitation to the question about reasons for the anticipation of maintained use of the adductor programme is that it only considers adductor programme characteristics, and no other facilitators and barriers for the maintenance. A more suitable approach may have been to ask about the perceived support from other staff and administrative club personnel, and to ask participants about potential barriers to include the “Adductor Strengthening Programme” as part of the club's sports plan policy. This is because maintenance of IPEPs constitutes a particular challenging, since team staff in elite football teams often come and go, whereas effect of injury prevention such as the “Adductor Strengthening Programme” is depending on continuity and sustainment.

5.7 “Best practice” application

“Best practice” can be understood as a method that is generally accepted as superior to any alternative either because it produces results that are superior to those achieved by other means, or because the method has become a standard of how something is being used. In line with the somewhat gradually shrinking gap between science and field practice, a more contemporary understanding of best practice is the merging of these two, where scientific evidence and practical experience are combined. This coincides with the concept of evidence-based practice, implying that the best results in a real-world context is achieved when practitioners use several sources of knowledge (Kitson, Harvey, & McCormack, 1998). These considerations are taken into account in the following attempt to develop a “best practice application” of the adductor programme.

Exercise dosage is the product of exercise volume and intensity. In terms of volume, practical experience shows that teams in the real-world context use the “Adductor Strengthening Programme” with fewer repetitions per set, but with more sets per side, compared to the programme protocol recommendations, both preseason and in-season. As the frequency is usually unmodified, the overall weekly volume used seems either equal to, or slightly higher than, the total weekly volume that is recommended. This is interesting, as different use of sets and repetitions are believed to produce somewhat similar strength effects as long as the overall weekly exercise volume is equated (Raastad et al., 2010). Scientific evidence has also demonstrated a dose response-relationship where increases in exercise volume correlates significantly to superior reductions in injury rates. This applies both for IPEPs generally (Lauersen et al., 2018), and for “Copenhagen Adduction” in relation to reductions of groin injuries, specifically (Lasse Ishøi & Thorborg, 2021). An initial thought may therefore be that the higher “Adductor Strengthening Programme” volume during preseason, the better, but as both coaching staff and players as aforementioned usually are more focused on football performance, this is not realistic. It is therefore more important to establish the minimal required volume necessary to achieve and maintain meaningful positive effects (O'Brien et al., 2018). Regarding “Adductor strengthening Programme” strength gains specifically, Lasse Ishøi and Thorborg (2021) has stated that the answer is at least 500 repetitions during a six to eight week long strengthening phase. However, in the study by Harøy, Clarsen, et al. (2019) where prevalence and risk of groin problems were substantial reduced, players performed 480 during a six to eight week long

strengthening phase (Lasse Ishøi & Thorborg, 2021). Uncertainty regarding weekly volume in terms of number of repetitions is in line with the lack of consensus on the optimal number of repetitions and sets when prescribing IPEPs in elite football teams (McCall et al., 2020). Regarding in-season “Adductor Strengthening Programme” volume, Rønnestad, Nymark, and Raastad (2011) found that Norwegian male elite football players who increased their lower limb strength with three weekly sets of general strength training during preseason, had maintained their strength after six weeks when only performing one set weekly. This is in line with findings suggesting that one third to one ninth of the volume needed to achieve strength gains, is required to maintain the increased muscle strength in adult males (Bickel, Cross, & Bamman, 2011).

In terms of intensity, the “Adductor Strengthening Programme” must be performed with an intensity that induces muscular fatigue to secure recruitment of high-threshold motor units, if muscle strength gains are to be achieved (Lasse Ishøi & Thorborg, 2021; Pescatello, Riebe, & Thompson, 2014). However, muscular fatigue is also associated with muscle soreness, which may be a barrier to sufficient “Adductor Strengthening Programme” implementation. It is therefore important that some muscular fatigue is induced, without being induced in such amounts that players experience more muscle soreness than what is tolerated. This may be achieved with an approach where players end each set when they feel a little fatigued, but still could have performed some more repetitions in the given set before reaching muscular failure (Raastad et al., 2010). Both interestingly and beneficial, this approach does not result in inferior strength gains compared to an approach where sets are being performed so muscular failure is reached (Nóbrega & Libardi, 2016). Whether the optimal crossing point for the necessary fatigue without provocation of unwanted amounts of muscle soreness is at seven to eleven repetitions in each set, which is what is most often performed preseason and in-season, is uncertain. Considering the importance of training intensity, one may ask whether the principle that equal strength effects are produced when overall weekly exercise volume is equal, also applies for the “Adductor Strengthening Programme”. This is because the adductor programme consists of a bodyweight exercise where no external load is used. In contrast, exercises often included in studies on strength effects of a higher number of sets with fewer repetitions in each set use external load to ensure that the necessary fatigue is induced even in sets with fewer repetitions (Raastad et al.,

2010). Thus, this is not comparable to the “Adductor Strengthening Programme”, where the only method to ensure that fatigue is being continuously induced is to perform a somewhat higher number of repetitions in each set. It may therefore be recommended that football players at least perform the number of repetitions in each set that the respondents replied that is being the present practice. In terms of the need of a preseason strengthening phase, this is considered indisputably as important (American College of Sports Medicine, 2009; Lauersen et al., 2018; Polglass et al., 2019), and should be part of any IPEP recommendation.

Based on practical experience through how the respondents described their use of the “Adductor Strengthening Programme”, and scientific evidence considering programming of IPEPs, a best practice application of the “Adductor Strengthening Programme” is suggested in **table 10**. This suggestion adds up to a total of about 620 repetitions being performed during an eight week strengthening phase, which is more than enough to expect meaningful strength gains (Lasse Ishøi & Thorborg, 2021). The in-season maintenance phase consists of a volume of about 50% of the mean weekly preseason volume, which is enough volume to expect maintained strength gains (Bickel et al., 2011).

Table 10: Suggestion to a “best practice” application of the “Adductor Strengthening Programme” protocol.

	Week	Sessions per week	Sets per side	Repetitions per set
Preseason (weeks)	1	2	1	3-5
	2	3	2	3-5
	3-4	3	2	6-8
	5-6	3	2	6-8
	7-8	2	2	8-10
	In season	1	2	8-10

Moreover, we suggest to keep the other recommendations originally described by Harøy, Clarsen, et al. (2019). This includes that we recommend teams to use the “Adductor Strengthening Programme” as a warm-up before regular training, and that we recommend to regress to an easier level of pain more than three on a 0-10 NRS is experienced. This is because we believe that specific recommendations may facilitate

implementation at least some, especially if the “Adductor Strengthening Programme” are to be integrated as part of regular practice at the club and organisational level, as encouraged by Finch and Donaldson (2010). This is despite the fact that each team, irrespective of level, constitutes a unique delivery context, and no consensus exists on these aspects (McCall et al., 2020). However, to implement the program in the most optimal way possible, we recommend all teams to include players in the decision-making in the implementation process, which our results suggest is not being a part of the current practice. Such inclusion of the user perspectives in the decision-making is equally important as the delivery agents practical experience and scientific evidence, thus being vital if practice is to be in line with the concept of evidence-based practice (Kitson et al., 1998). This also applies the elite football teams in the real-world context (Fullagar, McCall, Impellizzeri, Favero, & Coutts, 2019)

5.8 Methodological considerations

5.8.1 Participants’ formal team staff role

The discrepancy in team staff role among respondents in our study compared to the previous studies may have affected the results in terms of attitudes and beliefs regarding the “Adductor Strengthening Programme”. Effects of such differences is highlighted by O'Brien et al. (2018): For example, physiotherapists and medical doctors are educated within health science, and employed as medical staff who are often mainly focused on player’s health and medical aspects including injury prevention. Fitness coaches and/or strength and conditioning coaches, and head coaches on the other hand are usually employed as coaching staff, mostly focused on team success, technical and tactical aspects, and physical performance (O'Brien et al., 2018). Moreover, McCall et al (2014) described physiotherapists being the most numerous team staff involved in delivery of IPEPs. This makes it reasonable to believe that physiotherapists may be the team staff with the most first-hand experience in delivering injury prevention.

Attitudes and beliefs can therefore have been influenced by the respondent’s formal team staff role, education, and experience. For example, a physiotherapist may generally be more aware of different IPEPs. Moreover, physiotherapists may also be more likely to perceive a programme’s injury prevention effect as the superior reason for choosing to implement it. This is opposed to coaching staff, who may consider a programme’s performance enhancing effect as the superior reason. In addition, this study

may have been subject to social-desirability bias. This is an information bias where respondents may have responded in a manner they believed was desirable and expected of them, not necessarily reflecting the respondents actual attitudes and beliefs (Johannesen et al., 2010). For instance, in terms of awareness of IPEPs and beliefs about their preventative effect a physiotherapist may feel other expectations from the environment than what a strength and conditioning coach feel.

A suitable question to ask when discrepancies occur in terms of participants' characteristics between studies with somewhat similar aims, is whether our study was susceptible to a selection bias. This bias is a systematic error resulting in differences between those who are, and those who are not included in a study (Johannesen et al., 2010). This could for example be due to our recruitment method, as participants contact information was obtained mainly through the network of one physiotherapist (JS). However, both during the recruitment method and in the initial information in the questionnaire, it was clearly specified in the information that participation was intended solely to apply to the person being the primary responsible for injury prevention in their team. Also, the calls to remaining teams asking for contact information to the primary delivery agent of preventative training also led to obtaining contact with mostly physiotherapists. These factors reduced the probability that our sample is a subject of a selection bias, which further strengthens the argument that the participants in our study was the true delivery agents in Norwegian male elite football teams.

The discrepancy between our study and referred previous studies in terms of responding delivery agents' team staff role, may be due to differences in the constellations of, and the responsibility within, team staff in the surveyed populations. Historically, physiotherapists have reigned "top dog" in terms of athletes and injuries, often being largely involved also in exercise prescription. However, there is an ongoing discussion on whether strength and conditioning coaches may be more suitable as responsible for exercise prescriptions regarding injuries (Ehiogu, 2021). A possible explanation is therefore that Norwegian teams may be holding on to the tradition of having physiotherapists as primarily responsible for injury prevention, while international elite teams to a greater extent have let strength and conditioning coaches have this responsibility. The number of team staff may also be somewhat larger in the Norwegian teams than in the international elite teams in referred studies, making our included

participants having combined roles with both injury prevention and strength and conditioning responsibilities. Also, our study aimed to investigate attitudes and beliefs among the primary delivery agents, defined as the person within the team staff having the main responsibility for injury prevention. That mainly physiotherapists have responded, does not exclude the possibility that coaching staff also are involved in the delivery of injury prevention in Norwegian teams. Moreover, support from other team staff has been described among delivery agents as an important facilitator for IPEP implementation (Lindblom et al., 2018; Shamlaye et al., 2020). In future research, it would therefore be interesting to conduct similar investigations of attitudes and beliefs among coaching staff, as our investigation only represents one, although important, nuance of a highly complex real-world elite football context.

5.8.2 Strengths and limitations

This study was conducted with a descriptive cross-sectional design. A cross sectional study design is suitable to collect information about how a phenomenon varies between people in a target group at a specific point in time, and to generate hypothesis for future research (Laake et al., 2008; Thing & Ottesen, 2013). A shortcoming of this design was that it only provided a snapshot of the phenomenon we were investigating. Therefore, this cross-sectional study could not express anything about correlations and causal relationships (Johannesen et al., 2010). In terms of data collection method, we chose to develop and conduct a survey due to several reasons. Firstly, a survey was suitable to collect responses from a wide geographical area. This was necessary as the delivery agents were affiliated with elite football teams throughout all of Norway. Secondly, a survey made it possible to investigate several variables at once, such as all dimensions in the RE-AIM framework. Thirdly, a survey was somewhat less resource demanding, being cost-effective and providing a relatively quick data collection. This was fitting well both in relation to the master projects limited timeframe and the fact that compliance and response rates among participants often are reduced in more time-consuming data collections (Johannesen et al., 2010).

One major strength of our study was the high response rate, with 91% fully completing the questionnaire. This ensured a high external validity, providing a greater probability that our results could be generalised to all delivery agents in Norwegian male elite football teams. The high response rate could be explained by several considerations: (1)

we distributed the questionnaire during a seasonal break to ensure participants having less workload, (2) we distributed the questionnaire and reminders in the evening to avoid regular working hours, (3) we sent weekly reminders to non-responding participants, and (4) we encouraged the participants when having challenges/difficulties responding. Other factors likely to have contributed the high response rate were inclusion of the study's aim in the questionnaires initial part, the deliberate limitation of time spent to complete the survey, and the high degree of closed questions. This is in line with measures recommended to increase participants motivation to complete a survey (Johannesen et al., 2010).

A further strength was that the questionnaire was thoroughly pilot tested prior to the data collection. This ensured an independent evaluation of the questionnaires content validity expressing whether it cover all dimensions of the phenomena, as several people with relevant experience gave feedback on understanding, readability and relevance of included questions and pre-defined response options. Additionally, two experts experienced with constructing questionnaires gave feedback on the questionnaire outside the more formal pilot study. Such pilot testing with participants having similar characteristics as the target group and additional feedback from professionals considered as experts on the field are strongly recommended when aiming to achieve a high response rate (Johannesen et al., 2010; Laake et al., 2008).

This study had some methodological limitation, too. One limitation that may have affected the results is the validity of our self-developed questionnaire not being fully systematically explored. Validity is a prerequisite to draw valid conclusions. In addition to content validity, which in large parts was ensured performing a pilot study, such validity also concerns construct validity and criterion validity. This expresses whether the questionnaire measures what it was intended to measure, and how well the measurement correlated with or predicts another valid and observable variable (Pripp, 2018). Construct validity are typically ensured by having several questions covering the same phenomena, whereas criterion validity usually are ensured by testing the questionnaire with comparison to a "gold standard" questionnaire with established validity (Pripp, 2018). However, the number of questions was deliberately limited, as a higher number of questions is associated with reduced response rates (Johannesen et al., 2010). Moreover, using of the RE-AIM framework when we structured the

questionnaire in addition to inspiration drawn from previous similar questionnaires may have compensated for lack of specific criterion validity.

Another limitation likely to have affected our results is that several questions related to the “implementation” dimension are prone to recall bias. Recall bias is a systematic measurement error due to inaccuracy of memories regarding events from the past (Porta, 2014). This applied especially to the questions about players performance of the “Adductor Strengthening Programme” in preseason, which was several months back in time at the time of the survey. Due to the demands placed on respondent’s memory, such retrospective questions are considered to have somewhat limited value compared to prospective data collections (Junge & Dvorak, 2000). That our study did not include a question about delivery agents perceived support from coaches and club officials represents a contrast to the studies that our questionnaire was inspired from (Andersson et al., 2019; Harøy, Wiger, et al., 2019). This also represented a limitation to our study, since the degree of support from coaches and club officials are considered as key facilitators to the implementation of IPEPs in the real-world context (Finch & Donaldson, 2010; O’Brien & Finch, 2016). Thus, information about the perceived support represents an important consideration when aiming to understand the implementation context.

A methodological challenge with this master project is the discrepancy in terminology and definitions between our study and many similar studies. Whereas other studies have used the traditional “time-loss” injury definition concerning injuries leading to time lost from participation, our survey consistently asked about “groin problems” specifically defined for the participants in line with the “all physical complaints” definition. However, the specific terminology and definitions being used in our survey was carefully determined. Firstly, the aim was to use an injury definition being in line with the intervention study on the “Adductor Strengthening Programme” by Harøy, Clarsen, et al. (2019). Secondly, we chose definitions in line with recommendations used in research concerning injuries, both in general (Bahr, 2009) and for groin injuries specifically (Weir et al., 2015). Nor did our study differentiate between categories of groin pain in line with the defined clinical entities described in the Doha consensus statement (Weir et al., 2015). However, we considered this not necessary as this recommendation first and foremost applies for epidemiological research.

5.9 Future directions

In this master project, we have investigated the attitudes and beliefs of delivery agents in Norwegian male elite football teams, regarding the groin injury prevention exercise programme “Adductor Strengthening Programme”. We have also suggested a “best practice” application of the “Adductor Strengthening Programme”. Since similar investigations is conducted in only once before, then among players (Harøy, Wiger, et al., 2019), this study can be used to generate new hypotheses to establish larger and more in-depth studies about attitudes and beliefs regarding the “Adductor Strengthening Programme”. Involvement of football coaches and sports officials is considered as a key to mitigate injury burdens in players in the elite football context (Ekstrand, 2013). Future studies should therefore investigate attitudes and beliefs among football coaches and sports officials such as sports directors, regarding the “Adductor Strengthening Programme”. This would be in line with recommendations by Finch and Donaldson (2010), stating that for sports injury preventions implementation research to be efficacious, all multiple levels of the sports delivery hierarchy must be targeted.

Since coaches and players may be more focused on performance aspects than injury prevention (O'Brien et al., 2018), future studies should also investigate effects of the “Adductor Strengthening Programme” on performance test. This would have been similar to the development of research on “FIFA 11+” and “Knee Control” (Hwang & Kim, 2019; Lindblom, Waldén, & Hägglund, 2012). Moreover, our study coincides most with the fifth step in the aforementioned TRIPP framework by Finch (2006) which aims to understand the factors that facilitates and impedes widespread adoption and sustainability of IPEPs in the real-world context. A natural step forward for future studies would then be to investigate the effectiveness of the best practice application, or any other modification that is the most widely used way of performing the “Adductor Strengthening Programme” in real-world context. This would be in line with the sixth and last step in the TRIPP framework (Finch, 2006). Lastly, as a step forward to further shrink the gap between research and practice, we recommend that male elite football teams implement the “best practice” application of the “Adductor Strengthening Programme” suggested in this study. This is aimed to combine characteristics in the evidence-based programme protocol, with what is considered practically feasible in the real-world football context, hopefully optimising the mitigation of groin problems in male elite football teams.

6. Conclusion

Our results demonstrate that delivery agent in Norwegian male elite football teams believe that football players is at medium to high risk of getting groin problems. They are aware of the “Adductor Strengthening Programme” or “Copenhagen Adduction”, which is believed by all to mitigate the burden of groin problems, and by nearly all to increase football performance. The “Adductor Strengthening Programme” was adopted by all teams, usually with modifications. Here, the most widespread change was to reduce the number of repetitions in each set, while performing a higher number of sets per side, compared to the evidence-based protocol. A wide range of settings and locations seems to be used to perform the “Adductor Strengthening Programme”, while the most important reasons for using the programme was the injury prevention effect and that it does not require exercise equipment. Lastly, all delivery agents expect of one anticipated to use the “Adductor Strengthening Programme” in the following season, due to the same reasons as mentioned above.

Thus, this master project has highlighted that the delivery agents have a positive attitude towards the “Adductor Strengthening Programme”. This is an important facilitating factor in the process of implementing any IPEP (McKay et al., 2014), possibly being an important reason to why there is a widespread adoption of the “Adductor Strengthening Programme” among Norwegian male elite football teams. As most teams use the programme with modifications, we have suggested a best practice application of the “Adductor Strengthening Programme”, indented to combine practical experience and scientific evidence. It could be recommended that the suggested “best practice” application to be implemented as part of football teams training regime.

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Appendix 1:

Spørreskjema

Har du lest og godkjenner samtykkeskjema?

- Ja

1. Hva er din alder?

- 18-30 år
 31-45 år
 46-60 år
 Over 60 år

2. På hvilket nivå spiller laget hvor du er ansatt?

- Eliteserien
 OBOS-ligaen

3. Hva er din stilling i laget hvor du er ansatt?

- Hovedtrener
 Assistenttrener
 Fysisk trener
 Fysioterapeut
 Lege
 Annet helsepersonell (spesifiser) _____
 Annen stilling (spesifiser) _____

4. Hvilken utdanning og/eller kurs har du?

Det er mulig å krysse av for flere alternativer

- NFFs UEFA PRO-lisens kurs
 NFFs UEFA A-lisens kurs
 NFFs UEFA B-lisens kurs
 Årsstudium/grunnfag i idrett
 Bachelorstudium/mellomfag i idrett
 Masterstudium/hovedfag i idrett
 Bachelorstudium i helsefaglig utdanning
 Masterstudium i helsefaglig utdanning
 Annen utdanning og/eller kurs (spesifiser) _____

5. Hvor mange års erfaring har du med forebyggende trening av fotballspillere?

- 0-4 år
- 5-9 år
- 10-14 år
- 15-20 år
- Mer enn 20 år

Videre vil du få to spørsmål som omhandler lyskeproblemer.

Med lyskeproblemer menes enhver smerte, ubehag, stivhet, klikking eller andre plager relatert til lysken, eller redusert treningsdeltakelse, treningsvolum eller prestasjon grunnet problemer med lysken.

6. Hvor stor risiko mener du at fotballspillere har for å få lyskeproblemer?

- Stor risiko
- Middels risiko
- Liten risiko
- Ingen risiko
- Vet ikke

7. Hvor viktig mener du det er at fotballspillere utfører forebyggende trening for å forhindre lyskeproblemer?

- Veldig viktig
- Middels viktig
- Litt viktig
- Ikke viktig
- Vet ikke

8. Visste du om «Adductor Strengthening Programme» og/eller «Copenhagen Adduction» øvelsen før du leste informasjonen i innledningen til dette spørreskjemaet?

- Ja
- Nei
- Vet ikke

9. Fra hvor har du fått informasjon om «Adductor Strengthening Programme» og/eller «Copenhagen Adduction» øvelsen?

Det er mulig å krysse av for flere alternativer

- Skadefri nettside
- Skadefri applikasjon
- Artikkel i British Journal of Sports Medicine
- Konferanse/kurs
- Infografikk

- Sosiale media (twitter, facebook, instagram o.l.)
- Annet (spesifiser) _____
- Vet ikke

10. Kryss av dersom du er kjent med at du kan finne informasjon om «Adductor Strengthening Programme» og/eller «Copenhagen Adduction» øvelsen aktuelle steder:

Det er mulig å krysse av for flere alternativer

- Skadefri nettside
- Skadefri applikasjon
- Artikkel i British Journal of Sports Medicine
- Infografikk
- Sosiale media (twitter, facebook, instagram o.l.)
- Annet (spesifiser) _____

Videre vil du få ett spørsmål som omhandler lyskeproblemer.

Med lyskeproblemer menes enhver smerte, ubehag, stivhet, klikking eller andre plager relatert til lysken, eller redusert treningsdeltakelse, treningsvolum eller prestasjon grunnet problemer med lysken.

11. Mener du at «Adductor Strengthening Programme» kan påvirke omfanget av lyskeproblemer?

- Ja, programmet kan i stor grad redusere omfanget
- Ja, programmet kan i en viss grad redusere omfanget
- Nei, programmet kan ikke påvirke omfanget
- Ja, programmet kan i en viss grad øke omfanget
- Ja, programmet kan i stor grad øke omfanget
- Vet ikke

12. Mener du at «Adductor Strengthening Programme» kan påvirke prestasjon i fotball?

- Ja, programmet kan i stor grad øke prestasjon
- Ja, programmet kan i en viss grad øke prestasjon
- Nei, programmet kan ikke påvirke prestasjon
- Ja, programmet kan i en viss grad redusere prestasjon
- Ja, programmet kan i stor grad redusere prestasjon
- Vet ikke

Hvordan mener du at følgende av spillernes fysiske egenskaper kan påvirkes av «Adductor Strengthening Programme»:

13. Lineær akselerasjon?

- Stor økning
- Viss økning
- Uendret
- Viss reduksjon
- Stor reduksjon
- Vet ikke

14. Topphastighet?

- Stor økning
- Viss økning
- Uendret
- Viss reduksjon
- Stor reduksjon
- Vet ikke

15. Retningsforandring?

- Stor økning
- Viss økning
- Uendret
- Viss reduksjon
- Stor reduksjon
- Vet ikke

16. Vertikal spenst?

- Stor økning
- Viss økning
- Uendret
- Viss reduksjon
- Stor reduksjon
- Vet ikke

17. Duellkraft?

- Stor økning
- Viss økning
- Uendret
- Viss reduksjon
- Stor reduksjon
- Vet ikke

Hvordan mener du at andre faktorer kan påvirkes av «Adductor Strengthening Programme»:

18. Tilgjengelighet av spillere til kamp?

- Stor økning
- Viss økning
- Uendret
- Viss reduksjon
- Stor reduksjon
- Vet ikke

19. Tilgjengelighet av spillere til trening?

- Stor økning
- Viss økning
- Uendret
- Viss reduksjon
- Stor reduksjon
- Vet ikke

20. Vannersjanse i kamp?

- Stor økning
- Viss økning
- Uendret
- Viss reduksjon
- Stor reduksjon
- Vet ikke

21. Hvilke andre **positive** egenskaper/prestasjoner/konsekvenser mener du at «Adductor Strengthening Programme» kan gi? Beskriv med egne ord.

22. Hvilke andre **negative** egenskaper/prestasjoner/konsekvenser mener du at «Adductor Strengthening Programme» kan gi? Beskriv med egne ord.

23. Bruker du «Adductor Strengthening Programme» i ditt lag?

- Ja, som beskrevet i protokoll
- Ja, som modifisert variant
- Nei
- Vet ikke

24. Hvordan bruker du «Adductor Strengthening Programme»?

- Som del av organisert fotballtrening
- Som del av organisert styrketrening
- Som selvstendig forberedelse i garderobe eller styrkerom før trening
- Som veiledet forberedelse i garderobe eller styrkerom før trening
- Som selvstendig trening i separat styrketreningsøkt
- Annen måte (spesifiser) _____

Når du bruker «Adductor Strengthening Programme» i sesong:

25. Hvor ofte gjør spillerne programmet?

- Mer enn 1 gang ukentlig
- 1 gang ukentlig
- 1 gang annenhver uke
- Vi gjennomfører programmet, men sjeldnere enn 1 gang annenhver uke

26. Hvor mange serier gjør spillerne?

- Mer enn 2 serier per bein
- 2 serier per bein
- 1 serie per bein

27. Hvor mange repetisjoner gjør spillerne i hver serie?

- Mer enn 15 repetisjoner per bein
- 12-15 repetisjoner per bein
- 8-11 repetisjoner per bein
- 4-7 repetisjoner per bein
- Mindre enn 4 repetisjoner per bein

Når du bruker «Adductor Strengthening Programme» før sesong (under normale omstendigheter, ikke covid-19):

28. Hvor ofte gjør spillerne programmet?

- Mer enn 3 ganger ukentlig
- 3 ganger ukentlig
- 2 ganger ukentlig
- 1 gang ukentlig

- Vi har gjennomført programmet, men sjeldnere enn 1 gang ukentlig

29. Hvor mange serier gjør spillerne?

- Mer enn 2 serier per bein
- 2 serier per bein
- 1 serie per bein

30. Hvor mange repetisjoner gjør spillerne i hver serie?

- Mer enn 15 repetisjoner per bein hver uke
- 12-15 repetisjoner per bein hver uke
- 7-10 repetisjoner per bein hver uke
- 3-5 repetisjoner per bein hver uke
- 3-15 repetisjoner per bein, ukesvis progredierende (som i protokoll)
- 3-15 repetisjoner per bein, ukesvis progredierende (egen modifikasjon)

31. Hva har vært viktig for at du har valgt å bruke «Adductor Strengthening Programme»?

Det er mulig å krysse av for flere alternativer

- Programmets skadeforebyggende effekt
- Tidsbruk ved programmet
- At programmet består av én øvelse
- At programmet består av tre vanskelighetsgrader
- At programmet er en partnerøvelse
- At programmet ikke krever treningsutstyr
- Annet (spesifiser) _____

32. Bruker du annen forebyggende trening enn «Adductor Strengthening Programme», med hensikt å redusere omfanget av lyskeproblemer?

- Ja
- Nei
- Vet ikke

33. Hvilken trening gjennomfører du i tillegg til, eller i stedet for, «Adductor Strengthening Programme» for å redusere omfanget av lyskeproblemer? Beskriv med egne ord mest mulig detaljert hvilke(n) øvelse(r), hvordan de(n) utføres, dosering (serier, repetisjoner, intensitet), og annet du anser som relevant.

34. Hvorfor valgte du/dere å gjøre det som er beskrevet i forrige besvarelse, og hvem deltok i beslutningen? Beskriv med egne ord.

35. Ser du for deg å bruke «Adductor Strengthening Programme» i ditt lag neste sesong?

- Ja, som beskrevet i protokoll
- Ja, som en modifisert variant
- Nei
- Vet ikke

36. Hva er årsaken til at du ser for deg å bruke «Adductor Strengthening Programme» i ditt lag neste sesong?

Det er mulig å krysse av for flere alternativer

- Programmets skadeforebyggende effekt
- Tidsbruk ved programmet
- At programmet består av én øvelse
- At programmet består av tre vanskelighetsgrader
- At programmet kan utføres som en partnerøvelse
- At programmet kan utføres alene
- At programmet ikke krever treningsutstyr
- Annet (spesifiser) _____

37. Hva er årsaken til at du ikke ser for deg å bruke «Adductor Strengthening Programme» i ditt lag neste sesong?

Det er mulig å krysse av for flere alternativer

- Programmets manglende skadeforebyggende effekt
- Tidsbruk ved programmet
- At programmet bare består av én øvelse
- At programmet bare består av tre vanskelighetsgrader
- At programmet kan utføres som en partnerøvelse
- At programmet kan utføres alene
- At programmet ikke krever treningsutstyr
- Annet (spesifiser) _____

38. Har du noen forslag til endringer av «Adductor Strengthening Programme» som kan gjøre det mer aktuelt å bruke programmet? Beskriv med egne ord.

Appendix 2:

Questionnaire

Have you read and approved the informed consent?

- Yes

1. What is your age?

- 18-30 years
 31-45 years
 46-60 years
 More than 60 years

2. At what level does the team where you are employed play?

- Eliteserien (Norwegian Premier League)
 OBOS-ligaen (Norwegian First Division)

3. What is your role in the team staff where you are employed?

- Head coach
 Assistant coach
 Fitness coach
 Physiotherapist
 Medical doctor
 Other healthcare profession (specify) _____
 Other position (specify) _____

4. What education and / or courses do you have?

It is possible to check several options

- UEFA PRO License
 UEFA A License
 UEFA B License
 One-year study in sport science
 Bachelor's degree in sport science
 Master's degree in sport science
 Bachelor's degree in a health profession
 Master's degree in a health profession
 Other education and/or courses (specify) _____

5. How many years of experience do you have as delivery agent of preventative training for football players?
- 0-4 years
 - 5-9 years
 - 10-14 years
 - 15-20 years
 - More than 20 years

Further, you will get two questions that deal with groin problems.

By groin problems is meant any pain, ache, stiffness, clicking/catching or other complaints related to the groin, or reduced training participation, training volume or performance due to groin problems.

6. How much risk do you think football players have getting groin problems?
- High risk
 - Medium risk
 - Low risk
 - No risk
 - Don't know
7. How important do you think it is to perform preventative training to mitigate groin problems?
- Very important
 - Medium important
 - A little important
 - Not important
 - Don't know
8. Were you aware of the “Adductor Strengthening Programme” and/or the “Copenhagen Adduction” exercise prior to reading the information in the introduction to this questionnaire?
- Yes
 - No
 - Don't know

9. Where did you get information about the “Adductor Strengthening Programme” and/or the “Copenhagen Adduction” exercise?

It is possible to check several options

- “Skadefri” website
- “Skadefri” application
- Article in the British Journal of Sports Medicine
- Infographics
- Course/conference
- Social media (Twitter, Facebook, Instagram etc.)
- Other (specify) _____
- Don’t know

10. Check if you are aware that you can find information about the “Adductor Strengthening Programme” and/or the «Copenhagen Adduction» exercise in these relevant places:

It is possible to check several options

- “Skadefri” website
- “Skadefri” application
- Article in the British Journal of Sports Medicine
- Infographics
- Social media (Twitter, Facebook, Instagram etc.)
- Other (specify) _____

Further, you will get two questions that deal with groin problems.

By groin problems is meant any pain, ache, stiffness, clicking/catching or other complaints related to the groin, or reduced training participation, training volume or performance due to groin problems.

11. Do you think that the “Adductor Strengthening Programme” can influence the burden of groin problems?

- Yes, the program can greatly mitigate the burden
- Yes, the program can moderately mitigate the burden
- No, the program cannot have an effect on the burden
- Yes, the program can moderately aggravate the burden
- Yes, the program can greatly aggravate the burden
- Don’t know

12. Do you think that the “Adductor Strengthening Programme” can influence football performance?

- Yes, the program can greatly increase performance
- Yes, the program can moderately increase performance
- No, the program cannot have an effect on performance
- Yes, the program can moderately decrease performance
- Yes, the program can greatly decrease performance
- Don't know

How do you think the following of the players' physical skills may be affected by doing the “Adductor Strengthening Programme”?

13. Linear acceleration?

- Large improvement
- Some improvement
- Unchanged
- Some decrease
- Large decrease
- Don't know

14. Top speed?

- Large improvement
- Some improvement
- Unchanged
- Some decrease
- Large decrease
- Don't know

15. Change of direction?

- Large improvement
- Some improvement
- Unchanged
- Some decrease
- Large decrease
- Don't know

16. Vertical jump ability?

- Large improvement
- Some improvement
- Unchanged
- Some decrease
- Large decrease
- Don't know

17. Dueling power?

- Large improvement
- Some improvement
- Unchanged
- Some decrease
- Large decrease
- Don't know

How do you think other factors can may be affected by doing the “Adductor Strengthening Programme”:

18. Availability of players for match?

- Large improvement
- Some improvement
- Unchanged
- Some decrease
- Large decrease
- Don't know

19. Availability of players for training?

- Large improvement
- Some improvement
- Unchanged
- Some decrease
- Large decrease
- Don't know

20. Chance of winning a match?

- Large improvement
- Some improvement
- Unchanged
- Some decrease
- Large decrease
- Don't know

21. What other positive characteristics / achievements / consequences do you think the “Adductor Strengthening Programme” can provide? Describe in your own words.

22. What other negative characteristics / achievements / consequences do you think the “Adductor Strengthening Programme” can provide? Describe in your own words.

23. Do you use the “Adductor Strengthening Programme” in your team?

- Yes, as described in the protocol
- Yes, as modified version
- No.
- Don't know

24. How do you use the “Adductor Strengthening Programme” in your training schedule?

- As part of organised football training
- As part of organised strength training
- As an independent preparation in the locker room or strength room before training
- As guided preparation in the locker room or strength room before training
- As independent training in a separate strength training session
- Other way (specify) _____

When using the “Adductor Strengthening Programme” in season:

25. How often did the players perform the program?

- More than once a week
- Once a week
- Once every two weeks
- We carried out the program, but less than once every two weeks

26. How many sets did the players perform?

- More than 2 sets per side
- 2 sets per side
- 1 set per side

27. How many repetitions did the players perform in each set?

- More than 15 repetitions per side
- 12-15 repetitions per side
- 8-11 repetitions per side
- 4-7 repetitions per side
- Less than 4 repetitions per side

When using the “Adductor Strengthening Programme” in preseason (under normal circumstances, not influenced by covid-19):

28. How often did the players perform the program?

- More than 3 times a week
- 3 times a week
- Twice a week
- Once a week
- We carried out the program, but less than once a week

29. How many sets did the players perform?

- More than 2 sets per side
- 2 sets per side
- 1 set per side

30. How many repetitions did the players perform in each set?

- More than 15 repetitions per set each week
- 12-15 repetitions per set each week
- 7-10 repetitions per set each week
- 3-5 repetitions per set each week
- 3-15 repetitions per set, weekly progressive (as in protocol)
- 3-15 repetitions per set, weekly progressive (as own modification)

31. What has been important for you in choosing to use the “Adductor Strengthening Programme”?

It is possible to check several options

- The program's injury prevention effect
- The time spent on the program
- The programme consists of one exercise
- The programme consists of three progression levels
- The programme is a partner exercise
- The programme does not require exercise equipment
- Other (specify) _____

32. Do you use other preventative training in addition to the “Adductor Strengthening Programme”, with the intention to mitigate the burden of groin problems?

- Yes
- No
- Don't know

33. What training do you use in addition to, or instead of, the “Adductor Strengthening Programme” to mitigate the burden of groin problems? Describe in your own words as detailed as possible which exercise (s), how they are performed, dosage (series, repetitions, intensity), and anything else you consider relevant.

34. Why did you choose to do what is described in the previous answer, and who participated in the decision? Describe in your own words.

35. Do you anticipate using the “Adductor Strengthening Programme” in your team the following season?

- Yes, as described in the protocol
- Yes, as an own modification
- No
- Don't know

36. What is the reason why you anticipate using the “Adductor Strengthening Programme” in your team in the following season?

It is possible to check several options

- The program's injury prevention effect
- The time spent on the program
- The program consists of one exercise
- The program consists of three progression levels
- The program can be performed as a partner exercise
- The program does not require exercise equipment
- Other (specify) _____

37. What is the reason why you do not anticipate using the “Adductor Strengthening Programme” in your team in the following season?

It is possible to check several options

- The program's lack of injury prevention effect
- The ime spent on the program
- The program consists of only one exercise
- The program consists of only three levels of difficulty
- The program can be performed as a partner exercise
- The program does not require exercise equipment
- Other (specify) _____

38. Do you have any suggestions for changes to the “Adductor Strengthening Programme” that may make it more relevant to use the program? Describe in your own words.

Appendix 3:

«Adductor Strengthening Programme»

Generelt

«Adductor Strengthening Programme» er et lyskeskadeforebyggende treningsprogram. Den originale versjonen av programmet «Adductor Strengthening Programme» består av én øvelse: «Copenhagen Adductor Exercise». Programmet har tre nivåer, hvor man skal bruke høyest mulig nivå uten at man opplever smerter eller redusert kvalitet på utførelse. Om man opplever lyskesmerter skal man gå ned i nivå. Øvelsen skal utføres i rolig tempo.

Protokoll

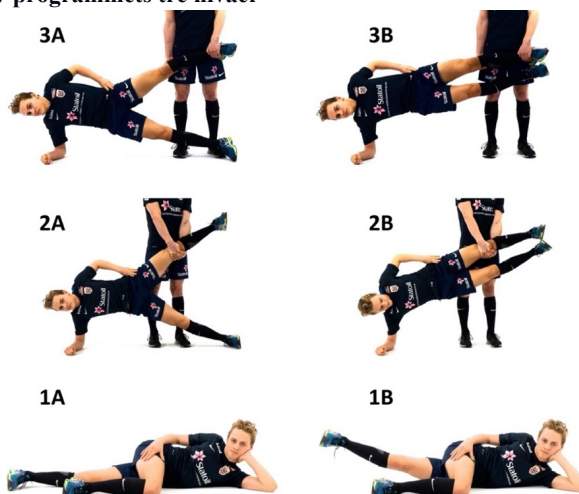
Før sesong:

Uke	Antall ukentlige økter	Antall repetisjoner per bein
1	2	3-5
2	3	3-5
3-4	3	7-10
5-6	3	12-15
7-8	2	12-15

I sesong og øvrig vedlikehold:

Om man har fulgt progresjonen som anbefalt for sesong, holder det å utføre øvelsen 1 gang ukentlig med 12-15 repetisjoner resterende uker av førsesongen, og i sesongen.

Illustrasjon av programmets tre nivåer



Referanse:

Harøy, J., Clarsen, B., Wiger, E. G., Øyen, M. G., Serner, A., Thorborg, K., ... & Bahr, R. (2019). The adductor strengthening programme prevents groin problems among male football players: a cluster-randomised controlled trial. *British journal of sports medicine*, 53(3), 150-157. (Hyperlink)

Appendix 4:

Samtykkeskjema

I dette skrevet får du informasjon om prosjektets formål og hva deltakelse innebærer for deg.

Formål

Prosjektet er en masteroppgave i idrettsfysioterapi på Norges idrettshøgskole i Oslo. Prosjektet har to formål:

1. Undersøke holdninger og oppfatninger til «Adductor Strengthening Programme», blant de som er ansvarlige for forebyggende trening i et fotballag på mannlig elitenivå.
2. Få kjennskap til en «best practice»-tilnærming til programmet, ved å undersøke hvordan dette gjennomføres i fotballag på mannlig elitenivå.

Hvem er ansvarlig for forskningsprosjektet?

Ansvarlig for dette prosjektet er Norges idrettshøgskole, ved:
Thor Einar Andersen
Joar Harøy
Joakim Stensø

Hvorfor får du spørsmål om å delta?

Den ansvarlige for forebyggende trening hos hvert enkelt lag i Eliteserien eller OBOS-ligaen i sesongen 2020 inviteres til å delta i studien. Totalt inviteres 32 personer. Dine kontaktopplysninger er innhentet ved at laget du er ansatt hos har blitt kontaktet med forespørsel om å utgi kontaktopplysninger til den som er ansvarlig for skadeforebyggende trening.

Hva innebærer det for deg å delta?

Hvis du velger å delta, innebærer det at du fyller ut et spørreskjema. Dette vil ta deg inntil 20 minutter. Spørreskjemaet inneholder spørsmål angående et treningsprogram som effektivt kan forebygge lyskeskader blant mannlige fotballspillere. Dine svar fra spørreskjemaet blir registrert elektronisk. Du vil få én ukentlig påminnelse per e-post i fire uker, og deretter påminnelse per telefon én gang, inntil du har besvart spørreskjemaet eller inntil du gir beskjed til masterstudenten at du ikke ønsker å delta i prosjektet.

Det er frivillig å delta

Det er frivillig å delta i prosjektet. Hvis du velger å delta, kan du likevel når som helst trekke samtykket tilbake uten å oppgi noen grunn. Alle dine personopplysninger vil da bli slettet. Det vil ikke ha noen negative konsekvenser for deg hvis du ikke vil delta eller senere velger å trekke deg. Dersom du etter besvarelse av spørreskjemaet likevel ønsker å trekke deg fra prosjektet, kan du ta kontakt med masterstudenten som så vil slette din besvarelse.

Ditt personvern – hvordan vi oppbevarer og bruker dine opplysninger

Vi vil bare bruke opplysningene om deg til dette prosjektet. Vi behandler opplysningene konfidensielt og i samsvar med personvernregelverket. Kun prosjektgruppa, bestående av Professor Thor Einar Andersen, idrettsfysioterapeut Joar Harøy og masterstudent Joakim Stensø vil ha tilgang til dine opplysninger. Din stilling, og hvilket nivå laget du er ansatt hos spiller på, vil erstattes med en kode som lagres på egen liste adskilt fra øvrige data og innelåst i et skap. Vi innhenter ikke informasjon om hvilket lag du er ansatt hos. I tillegg vil leverandør av spørreskjemaet lagre din IP-adresse i seks måneder. Hvis prosjektet fører til publisering av artikkel i et tidsskrift, vil ingen beskrivelser være av slik art at du eller lag/klubb kan gjenkjennes i publiseringen.

Hva skjer med opplysningene dine når vi avslutter forskningsprosjektet?

Opplysningene vil forbli lagret anonymisert når prosjektet avsluttes og masteroppgaven er godkjent, som etter planen er juni 2021.

Dine rettigheter

Så lenge du kan identifiseres i datamaterialet, har du rett til følgende:

- innsyn i hvilke personopplysninger som er registrert om deg, og å få utlevert en kopi av opplysningene
- å få korrigert personopplysninger om deg
- å få slettet personopplysninger om deg
- å sende klage til Datatilsynet om behandlingen av dine personopplysninger

Hva gir oss rett til å behandle personopplysninger om deg?

Vi behandler opplysninger om deg basert på ditt samtykke.

Etter søknad fra Norges idrettshøgskole har NSD – Norsk senter for forskningsdata AS, vurdert at behandlingen av personopplysninger i dette prosjektet er i samsvar med personvernregelverket.

Hvor kan jeg finne ut mer?

Hvis du har spørsmål til forskningsprosjektet, eller ønsker å benytte deg av dine rettigheter, ta kontakt med:

- Masterstudent Joakim Stensø, e-post joakimss@nih.no, mobil 9071881
- Professor Thor Einar Andersen, e-post t.e.andersen@nih.no, mobil 90153928
- Vårt personvernombud: personvernombud@nih.no

Hvis du har spørsmål knyttet til NSD sin vurdering av prosjektet, kan du ta kontakt med:

- NSD – Norsk senter for forskningsdata AS på e-post (personverntjenester@nsd.no) eller på telefon: 55582117.

Med vennlig hilsen

Thor Einar Andersen
(Forsker/hovedveileder)

Joakim Stensø
(Masterstudent)

Samtykkeerklæring

Ved å samtykke bekrefter du at du har mottatt og forstått informasjonen om prosjektet, at du har fått anledning til å stille spørsmål, og at dine opplysninger behandles frem til prosjektet er avsluttet.

Appendix 5:

Thor Einar Andersen
Institutt for idrettsmedisin

OSLO 13. juni 2020

Søknad 134 - 130820 – Holdninger og oppfatninger angående det forebyggende lysketreningsprogrammet «Adductor Strengthening Programme» blant ansvarlige for forebyggende trening i norske fotballag på herre elitenivå

Vi viser til søknad, prosjektbeskrivelse, spørreskjema, informasjonsskriv og innsendt søknad til NSD

I henhold til retningslinjer for behandling av søknad til etisk komitee for idrettsvitenskapelig forskning på mennesker, har leder av komiteen på fullmakt fra komiteen konkludert med følgende:

Vurdering

Det fremgår av søknaden at deltakerne som har samtykket vil bli purret hver uke på mail inntil fire ganger og deretter på telefon dersom de ikke besvarer spørreskjemaet. Komiteen ber om at det gis informasjon om dette i samtykkeskrivet og vil forøvrig minne om at det er frivillig å delta og at prosjektleder har et særlig ansvar for å unngå å legge press for deltakelse.

Vedtak

På bakgrunn av forelagte dokumentasjon finner komiteen at prosjektet er forsvarlig og at det kan gjennomføres innenfor rammene av anerkjente etiske forskningsetiske normer nedfelt i NIHs retningslinjer. Til vedtaket har komiteen v/leder lagt følgende forutsetning til grunn:

- *Vilkår fra NSD følges*
- *Samtykkeskrivet oppdateres med informasjon om puring dersom spørreskjemaet ikke besvares*

Komiteen gjør oppmerksom på at vedtaket er avgrenset i tråd med fremlagte dokumentasjon. Dersom det gjøres vesentlige endringer i prosjektet som kan ha betydning for deltakernes

helse og sikkerhet, skal dette legges fram for komiteen før eventuelle endringer kan iverksettes.

Med vennlig hilsen

Professor Sigmund Loland
Leder, Etisk komite, Norges idrettshøgskole

 **NORGES
IDRETTSHØGSKOLE**

Besøksadresse: Sognsveien 220, Oslo
Postadresse: Pb 4014 Ullevål Stadion, 0806 Oslo
Telefon: +47 23 26 20 00, postmottak@nih.no
www.nih.no

Appendix 6:

NSD NORSK SENTER FOR FORSKNINGSDATA

NSD sin vurdering

Prosjekttittel

Holdninger og oppfatninger angående det forebyggende lysketreningsprogrammet «Adductor Strengthening Programme» blant ansvarlige for forebyggende trening i norske fotballag på herre elitenivå

Referansenummer

837286

Registrert

03.06.2020 av Joakim Schanke Stensø - joakimss@student.nih.no

Behandlingsansvarlig institusjon

Norges idrettshøgskole / Institutt for idrettsmedisinske fag

Prosjektansvarlig (vitenskapelig ansatt/veileder eller stipendiat)

Thor Einar Andersen, t.e.andersen@nih.no, tlf: 90153928

Type prosjekt

Studentprosjekt, masterstudium

Kontaktinformasjon, student

Joakim Schanke Stensø, joakim.s.stenso@hotmail.no, tlf: 90718811

Prosjektperiode

01.09.2020 - 01.06.2021

Status

08.06.2020 - Vurdert

Vurdering (1)

08.06.2020 - Vurdert

Det er vår vurdering at behandlingen av personopplysninger i prosjektet vil være i samsvar med personvernlovgivningen så fremt den gjennomføres i tråd med det som er dokumentert i meldeskjemaet med vedlegg den 08.06.2020, samt i meldingsdialogen mellom innmelder og NSD. Behandlingen kan starte.

DEL PROSJEKTET MED PROSJEKTANSVARLIG

Det er obligatorisk for studenter å dele meldeskjemaet med prosjektansvarlig (veileder). Det gjøres ved å trykke på "Del prosjekt" i meldeskjemaet.

MELD VESENTLIGE ENDRINGER

Dersom det skjer vesentlige endringer i behandlingen av personopplysninger, kan det være nødvendig å melde dette til NSD ved å oppdatere meldeskjemaet. Før du melder inn en endring, oppfordrer vi deg til å lese om hvilke type endringer det er nødvendig å melde:
https://nsd.no/personvernombud/meld_prosjekt/meld_endringer.html

Du må vente på svar fra NSD før endringen gjennomføres.

TYPE OPPLYSNINGER OG VARIGHET

Prosjektet vil behandle alminnelige kategorier av personopplysninger frem til 01.06.2021.

LOVLIG GRUNNLAG

Prosjektet vil innhente samtykke fra de registrerte til behandlingen av personopplysninger. Vår vurdering er at prosjektet legger opp til et samtykke i samsvar med kravene i art. 4 og 7, ved at det er en frivillig, spesifikk, informert og utvetydig bekreftelse som kan dokumenteres, og som den registrerte kan trekke tilbake. Lovlig grunnlag for behandlingen vil dermed være den registrertes samtykke, jf. personvernforordningen art. 6 nr. 1 bokstav a.

PERSONVERNPRINSIPPER

NSD vurderer at den planlagte behandlingen av personopplysninger vil følge prinsippene i personvernforordningen om:

- lovlighet, rettferdighet og åpenhet (art. 5.1 a), ved at de registrerte får tilfredsstillende informasjon om og samtykker til behandlingen
- formålsbegrensning (art. 5.1 b), ved at personopplysninger samles inn for spesifikke, uttrykkelig angitte og berettigede formål, og ikke viderebehandles til nye uforenlige formål
- dataminimering (art. 5.1 c), ved at det kun behandles opplysninger som er adekvate, relevante og nødvendige for formålet med prosjektet
- lagringsbegrensning (art. 5.1 e), ved at personopplysningene ikke lagres lengre enn nødvendig for å oppfylle formålet

DE REGISTRERTES RETTIGHETER

Så lenge de registrerte kan identifiseres i datamaterialet vil de ha følgende rettigheter: åpenhet (art. 12), informasjon (art. 13), innsyn (art. 15), retting (art. 16), sletting (art. 17), begrensning (art. 18), underretning (art. 19), dataportabilitet (art. 20).

NSD vurderer at informasjonen som de registrerte vil motta oppfyller lovens krav til form og innhold, jf. art. 12.1 og art. 13.

Vi minner om at hvis en registrert tar kontakt om sine rettigheter, har behandlingsansvarlig institusjon plikt til å svare innen en måned.

FØLG DIN INSTITUSJONS RETNINGSLINJER

NSD legger til grunn at behandlingen oppfyller kravene i personvernforordningen om riktighet (art. 5.1 d), integritet og konfidensialitet (art. 5.1 f) og sikkerhet (art. 32).

SurveyXact er databehandler i prosjektet. NSD legger til grunn at behandlingen oppfyller kravene til bruk av databehandler, jf. art 28 og 29.

For å forsikre dere om at kravene oppfylles, må dere følge interne retningslinjer og eventuelt rådføre dere med behandlingsansvarlig institusjon.

OPPFØLGING AV PROSJEKTET

NSD vil følge opp ved planlagt avslutning for å avklare om behandlingen av personopplysningene er avsluttet.

Lykke til med prosjektet!

Kontaktperson hos NSD: Tore Andre Kjetland Fjeldsbø
Tlf. Personverntjenester: 55 58 21 17 (tast 1)

Appendix 7:

Free-text responses to open-ended questions

Hvilke andre positive konsekvenser/prestasjoner/egenskaper mener du at «Adductor Strengthening Programme» kan gi? Beskriv med egne ord.

- Programmet er prestasjonsfremmende og øker vinner sjansene i form av at det hjelper til med å holde spillerne skadefri og dermed får trent mer fotball.
- Den store konsekvensen er mindre risiko for at en skade setter begrensninger for trening og kamp. Det former utgangspunkt for utvikling av alt annet som går på prestasjon.
- ASP/CAS er en god øvelse, og sammen med andre øvelser så opplever jeg at spillerne er godt rustet for spill på Eliteserienivå. I året 2020 har min klubb kun en spiller med fravær i kamp pga lyskeplager.
- Gode rutiner på prestasjonsfremmende trening.
- Hurtighet i akselerasjon sidelengs bevegelser og nedbremsing sidelengs bevegelser
- Spilleren kan trene mer skudd og innleggstrening da de tåler det bedre ved økt adduktorkstyrke.
- Økt kamptilgjengelighet.
- Mindre skader fører til økt treningsdeltagelse som fører til økte prestasjoner. Alt henger jo sammen med den forebyggende effekten til programmet. min erfaring (som er begrenset), er at det er lite ren «prestasjonsfremmende» effekt av programmet
- Stronger core and pelvic stability. Reduction in groin area aches & pains.
- Bevisstgjøring, referanser på baseline
- Skadefri. Om en holder seg skadefri, ligger alt til rette for å bli en bedre fotballspiller.
- Stabilitet i bekkenet, økt et bens styrke.
Bedre ROM i hofterledd
Økt aktivering av setes muskulatur
- Tidlig identifikasjon av adduktorkrelatert patologi i sesong.

Hvilke andre negative konsekvenser/prestasjoner/egenskaper mener du at «Adductor Strengthening Programme» kan gi? Beskriv med egne ord.

- Ingen dersom man har en gradvis tilnærming.
- Doms
- Jeg har ingen negative egenskaper å si om ASP/CAS. I min klubb har vi systematisk benyttet dette programmet 4-5 ganger pr uke i 10-12 år. Selv før det kom forskning på det. Med en innarbeidet kultur og krav til spillergruppen, så er det ingen spillere som syter eller klager fordi de må gjennomføre øvelsen 4-5 ganger pr uke hos oss.
- Har ingen. Må evt være DOMS dersom man har slurvet i vedlikeholdsarbeidet...
- Evt påvirke vekstsoner hos unge utøvere om belastning ved øvelse ikke blir styrt nøye
- Opplever at en og annen utøver kan utvikle smerter ved treningen. Sårhet/stivet kan forekomme hos de som ikke er vant med treningen. Testing i forkant og riktig progresjon er viktig.

- Hvis det er kun denne øvelse (evt andre isolerte lyske øvelser) som anvendes for forebygging a lyske skader/ problematikk
- For noen spillere blir belastningen for tøff, er da bedre å bruke f. eks stående adduksjon med strikkmotstand
- Hvis det gjøres før trening, kan spillere oppleve at lyskene blir stiv/utmattet under trening. Jeg mener det bør gjøres etter trening eller i forbindelse med egne styrkeøkter.
- Utfordrende med dosering av dårlig trente utøvere. Særlig når utøvere skal inn i en tøffere Fotball syklus enn de er vandt til samtidig som man skal introdusere lysketrening.
- None
- Har opplevd at utøvere benytter øvelsen "fritt" og at det ikke gjennomføres etter protokoll. Noen bruker det som prep før økt, mens andre øker eller reduserer rep/sett.
- Spiller med (trolig) latente lyskeplager har med egen erfaring pådratt seg større muskel-/seneruptur i lyskefestet etter utførelse av "copenhagen nivå 3". Umulig å konstatere og lite troverdig at denne øvelsen var ene og alene med å lage skade i lyske.
- Feil teknikk og ugunstig belastning kan gi en negativ effekt.
- Stress av MCL
Pes anserinus
Reaktiv for ostitis pubis, sports-groin
- Utfordrende compliance gjennom sesong, spillere kan føle de "sliter" lyske ut før økt. Her har det vært hensigtsmessig å ligge det etter økten.

Hvilken trening gjennomfører du i tillegg til, eller i stedet for, «Adductor Strengthening Programme» for å redusere omfanget av lyskeproblemer? Beskriv med egne ord mest mulig detaljert hvilke(n) øvelse(r), hvordan de(n) utføres, dosering (serier, repetisjoner, intensitet), og annet du anser som relevant.

- Forskjellige varianter av core, bekken og hoftøvelser. Dosering er individuelt og kan variere gjennom sesong.
- Fifa 11 + - minimum 2ggr i uken.
styrketrening - dosert ulikt i henhold til utøvere - og i henhold til hvor i sesong vi er.
- Retningsforandring med fokus på kontroll av overkropp
- Stående øvelser. Kabel adduksjon hoft. Varianter, med og uten å holde seg fast. Variasjon fra mange reps, muskulær utholdenhet til maks.
Veldig avhengig av spiller. Ikke alle gjør denne øvelsen, ikke alle gjør copenhagen.
- ASP/CAS er øvelsen med høyest prioritet i vår skadeforebyggende trening.
I tillegg ruller vi også inn øvelser som:
Adductor squeeze med ball 10 reps x1
Trekkapparat fire øvelse, 1.adduksjon foran standbein, 2.adduksjon bak standbein, 3. hofteekstensjon, 4.hoftefleksjon. Aller øvelser 15 reps x1.
Step up på benk med medisball 10 reps x1.
Diverse andre øvelser som går på øke bevegeligheten i hoftelddet før trening.

- Sklibrett. Variert styrketrening. Motorisk kontroll. Dynamisk mobilitet som del av oppvarming.
- Tilsvarende øvelse i Redcord for variasjon og kontroll av belastning
- I tillegg: Isometrisk trening, beveglighetstrening, modifiserte basisøvelser som sumosquat, cossack squat mm.
- - Kabeløvelser hvor spilleren ligger på rygg og trekker beinet inn, ligge i en glute bridge variant mens man trekker beinet inn, og når spilleren står oppreist og trekker beinet inn. Ofte 3-4 set x 6-10 reps.
 - Stående på en fot med motsatt fot i 90-90 graders vinkel i hofte og kne + gjøre en pallof press variant. 2-3 set x 8-15 reps.
 - ligge i sideliggende planke + trekke inn kabel med arm og føre øverste fot opp og frem samtidig. 3 x 6-10
- Mobilitet, stabilitet, basistrening. Styrketrening i keiser apparat (wire)
- Stort fokus på hoftebeveglighet og abduktoraktivering i oppvarming. Daglig. Styrketrening med knebøy som også involverer adduktorer til en viss grad. Core kontroll trening.
- Diverse individuelle hofte øvelser (neuro muskulære øvelser), individuell belastnings styring, mobilitets øvelser for hofte etc
- Mtp lyskeproblematikk prøver vi i tillegg til fokus på adduktormuskulatur å fokusere på å forebygge iliopsoas, abdominal og proksimale rectus femoris skader gjennom å fokusere på dette i spillernes egentreningsprogrammer. F.eks øvelser som woodchopper, hoftefleksjon kabel strakt/bøyd etc. I vanlig pre-season to individuelle styrkeøkter i uken med disse øvelsene i tillegg til øvelser som knebøy. Ofte dosert som utgangspunkt 3 x 10.
- Stående adduksjon mot strikk, 2 sek konsentrisk, 2 sek statisk, 2 sek eksentrisk. Med støtte slik at balanse ikke er en utfordring. 2-3 set x 8 x 1-2 pr/uke. Så tungt som mulig Squeeze øvelser med pilatesball i forskjellige vinkler i hofte, daglig som preactivation. 2 set x 6-10.
- Abduktortrening: 4 ganger i uken før trening. Forskjellige øvelser. Coretrening: 4 ganger i uken før trening. Forskjellige øvelser. Stående lyskeøvelser med kabel: 1-3 ganger i uken i forbindelse med styrke. 3x8
- Generell styrke adduktor, hofteflexor og rotasjon.
- In addition to the adductor program we use: core activation, dynamic mobility, yoga, sliders, band work isometric, concentric & eccentric. Rehab based.
- Styrkeøvelser på treningsstudio:
 - Hip adduction maskin, 3x8 75% det spilleren tror er max
 - Adduksjon med strikk, 3x10
 - Knebøy, forskjellige varianter... 3x10, pyramide, avhengig av når i sesong og spillsituasjon
 - Utfall lineært og sidelengs 3x8 eller pyramide variant
 - Forskjellige hoppeøvelser, inkl hinke, hoppe i sirkler og 8- tall i tillegg til å hoppe og ned fra
 - kasser i forskjellige retninger.
 - Pre- season: Bruker forskjellige sprintøvelser under egne treninger, med forskjellige retningsforandringer.

- - Hoftesving (beskrevet på skadefri.no), 10-15 reps. lav intensitet. Gjennomføres som en del av preppen hver trening.
 - Utfall fremover. 10 reps på hvert ben. Intensitet lav.
 - Knebøy (rett frem og til siden). Gjennomføres med kroppsvekt pga mangel på utstyr. 5-12 repetisjoner, intensitet lav.
- Meget omfattende spørsmål. Nevromuskulær tilnærming. Øvelser med fokus på bekken posisjon/gluteal og fotens plassering mot underlaget. Dette for å unngå en økt grad av innrotasjon hofte og unngå økt grad av Anteriort pelvic tilt. Øvelses utvalg velges ut ifra nivå og med idrettsspesifikk sluttprodukt. Individ type oppbygging med varierende serier/rep/intensitet. Langsiktig mål om å øke nevmuskl kontroll og power
- Systematisk styrketrening (maks-styrke)
 - Repeated sprint training.
- Har individuelle program alle spillere som jobber utifra grunnbevegelse, svakheter, skadehistorikk og belastningsbilde
- Cph adduction er primær øvelse ift adduktor relaterte problemstillinger. I tillegg trenes variasjoner av squat der sumo er inkludert for adduktor fokus. Samme er adduktor drag i kabel og lyskehev i slynge der belastning kan reguleres ved vekststangarm (som i partnerøvelse) dette øker compliance off season. Styrkeprogram har også elementer for prehab av fleksor relaterte problemer.
- Vi bruker forberedende (prepøvelser) før trening for å varme lysken godt opp før trening og kamp. I tillegg bruker vi øvelser i spillernes individuelle treningsprogrammer, avhengig av spillerens alder, nivå og tidligere skader.

**Hvorfor valgte du/dere å gjøre som beskrevet i forrige svar, og hvem deltok i beslutningen?
Beskriv med egne ord.**

- Fordi det vil kunne gi en grad av enda større grad av robusthet for å forebygge lyskeplager. Erfaringsmessig har dette også hatt en god effekt. Beslutning tatt alene av fysioterapeut som ansvarlig for fysisk og skadeforebyggende trening.
- pga Individuelle forskjeller og effekt rundt FIFA 11+. Jeg i samråd med medisinsk team.
- Forsking fra SSC i Irland, som viser atleter med smerte beveger seg på en annen måte. Fysio og fysisk trener
- Får gjort øvelsene i stående. Mer funksjonelt, mer likt posisjoner som i fotball. Jeg deltok i beslutningen
- Fordi vi mener at ved å gjøre mer utfyllende øvelser så blir resultatet bedre enn å gjøre kun den ene. Men jeg må poengtere at ASP/CAS er den prioriterte øvelsen. Hvis vi pga av tid eller andre årsaker ikke rekker å gjøre mange øvelser så er det ASP/CAS som velges. Medisinsk team av tatt beslutningen på det.
- Ønsker god kultur for å forberede kroppen på trening og kamp, og bevissthet på øvelser som kan bidra i denne sammenheng.

- Fysisk trener er stor fan av slyngetrening
- Individuelle behov og justeringer ift totalbelastning. I samråd med spillere og fysisk trener.
- På bakgrunn av diskusjon om erfaring fra ulike typer øvelser med annet helsepersonell og spillere.
- Variasjon. Fysisk trener
- Erfaringsbasert kunnskap basert på en praktisk tilnærming til fotball og dens fysiske krav. Besluttet av meg selv som fysio og fysisk trener for laget.
- Ser på lyske problematikk som ett mer "multifaktorelt problem" som kan ha utspring fra mange forskjellige parametre. Alder, biomekanikk, trenings belastning osv
- Vi er halvproffe og har begrenset muligheter til å følge opp spillerne utover felles fotballtreninger, men vi prøver å ha stort fokus på skadeforebyggende trening. Gir ut felles styrke- og skadeforebyggende program, men prøver også å individualisere basert på historikk. God mulighet til å legge inn mye fokus på dette i lang koronapause. Kom seint i gang med fellestreninger igjen i forhold til andre lag pga spillere i fullt arbeid utenom. Fysioterapeut ansvar, men i samarbeid med resterende trenersteam. Fysioterapeut får mye frihet og ansvar til å styre opplegget på denne biten.
- Spillerne screenes med dynamometer før og under hver sesong, de som scorer lavt/ikke har gjort systematisk trening på lysker tidligere kjører øvelser med strikk. De som scorer høyt og er tilvendt styrketrening av lysker kjører Copenhagen adduktor level 3. Alle gjør squeeze, slides og andre lettere øvelser i oppvarming
- Noe er tatt fra Fifa-11, og noe er bygget på screeningtester og skadehistorikk for hver enkelt spiller.
- Enkelt gjennomførbart der det gjøres.
- Experience and as a response to injury and weakness.
- Det var gjort sammen med assistenttrener (som også er fysioterapeut til daglig) da vi sammen har ansvar for skadeforebyggende trening.
- Kunnskap om skadeforebyggende trening på lyske. Min kunnskap som utdannet helsepersonell, sammen med hovedtrener og assistenttrener som har kommet med innspill på erfaringer de har gjort seg opp gjennom årene i fotballen.
- Tilnærming basert på funn og nivå til utøver. Beslutning tatt av meg og slik det er nå diskuteres det ofte med meg selv da jeg er alene med ansvaret.
- Trenere og medisinsk
- Jeg er ansvarlig for det medisinske og fysiske treningen

Har du noen forslag til endringer av «Adductor Strengthening Programme» som kan gjøre det mer aktuelt å bruke programmet? Beskriv med egne ord.

- Bør inkludere flere øvelser som er tar for seg en større del av hoften og bekken.
- Hvilke dager man bør trene det i forhold til en ukesyklus og evt før/etter trening. Hva som gir best effekt
- Stående
- Det ville vært interessant om en kunne vurdert å inkludere nivå 4, med ekstern vekt for å optimalisere belastningen for de som er godt trent.
Men jeg har ingen forslag til forandring for de klubbene som velger å ikke bruke det. Som nevnt så bruker min klubb det 4-5 ganger pr uke.
- Nei
- Hvis ikke dette programmet er aktuelt nok i seg selv og tiden et tar å gjennomføre det, så blir prestasjonsfremmende/skadeforebyggende trening vanskelig å få implementert.
- Fungerer fint.
- Hvis vanskelighetsgraden blir for lett, kan man øke farten på øvelsen. Partner kan løfte beinet mens den som utfører er på vei ned, for å øke belastningen fra eksentrisk til konsentrisk fase.
- Utfordringen med alle slike spesifikke program er at det til slutt går på bekostning av helhet.
- No
- Mener personlig, at så lenger en gjør noe, så er det det viktigste. «Adductor Strengthening Programme» etter boken eller en variant med bra dosering som fungerer fint for laget ditt tror jeg vil utgjøre ingen/liten forskjell i lyskeproblemer i fotballaget.
- Jeg føler økning i selve programmet er litt for ekspansiv om de skal gjøre annen styrke/prehab trening.
Lett for at kvalitet og gjennomføringen blir dårlig og øker risiko for irritasjon i bukvegg, lyskeapparatet og kne om de har oppkjøring med annen belastning som fotball, løping og øvrig styrke.
- Min erfaring er at protokollen med 12-15 rep i sesong er litt i overkant. Som nevnt har jeg god erfaring med at øvelse gjøres i etterkant av fotballøkt.