Incidence, prevalence, severity, and risk factors for hip and groin problems in Swedish male ice hockey – A one-season prospective cohort study

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ABSTRACT

Context: The epidemiological focus on time loss may underestimate the true magnitude of hip and groin problems in male ice hockey players.

Objective: To describe the prevalence, incidence and severity of hip and groin problems (time loss and non-time-loss) in Swedish ice hockey players over the course of a season and to explore potential pre-season risk factors for these problems.

Design: Prospective one-season cohort study

Setting: Professional and semi-professional Swedish ice hockey

Patients or other participants: Twelve professional and semi-professional male ice hockey teams were invited to participate. Nine teams agreed to participate, and 163 players were included in analyses.

Main outcome measures: Hip and groin problems in the previous season (time loss; non-time-loss), isometric adduction and abduction strength, and five-second squeeze test were recorded prior to the season and served as independent variables in the risk factor analysis. Main outcome measures were cumulative incidence of hip and groin problems, average prevalence, and odds ratios for groin problems in-season

Results: Cumulative incidence for all problems was 45.4% (95% CI 37.6-53.4) and 19% (13.3-25.9) for substantial problems. Average prevalence was 14.1% (10.8-17.5) for all and 5.7% (4.3-7.2) for substantial problems. Among reported problems, 69.2% had gradual onset; where only
17% lead to time loss. Players with non-time-loss problems in the previous season had significantly higher odds for new problems [All: OR 3.3 (1.7-6.3); Substantial: OR 3.6 (1.8-8.4)]. Pre-season strength was not significantly associated with the odds for subsequent problems.

**Conclusion:** Hip and groin problems are common in ice hockey and may lead to substantial impairments in performance. Only one in five problems led to time loss and 7 out of 10 had gradual onset. Non-time-loss problems in the previous season were found to be a significant risk factor for new problems whereas preseason hip adduction and abduction strength was not.

**Keywords:** Ice hockey, groin pain, hip pain, epidemiology

**Abstract word count:** 292

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**Key points:**
- Over the course of a season, almost half of all ice hockey players may experience hip and groin problems and more than 4 in 5 of these problems are non-time-loss problems.
- Players with non-time-loss problems in the previous season had 3.6 times the odds of reporting new, severe hip and groin problems compared to players without problems in the previous season.
- Extra attention and preventive efforts may be required to keep players with a history of hip and groin problems (time-loss and non-time-loss problems) on the ice and performing.
Ice hockey is often associated with hip and groin problems, with terms such as “hockey groin syndrome” \(^1\) frequently used in the published literature, clinics and locker rooms. In collegiate ice hockey, where most of our epidemiological knowledge stems from, the incidence rate of hip and groin problems is 1.3 per 1000 athlete exposures \(^2\), and those injuries account for approximately 1 in 10 of all sustained injuries \(^3\). No other collegiate sport has an equally high proportion of hip and groin injuries among all injuries as ice hockey, and only soccer has an even higher incidence rate of hip and groin injuries \(^4\). The full extent of the problem may, however, be underestimated by the current literature. Traditionally, epidemiological studies on hip and groin problems in ice hockey only record injuries that lead to players being unable to participate in competition or training (time-loss definition of injury) \(^5,6\). That approach, however, neglects a large part of hip and groin problems – those that do not lead to time loss but nevertheless impair sporting performance, impact activities of daily living, and may require treatment.

Similar to other overuse injuries, hip and groin pain typically develops gradually, and often becomes a longstanding problem that does not necessarily leads to time loss \(^7\). More than 50% of hip and groin injuries in North American college players are reported to be non-time-loss problems, defined by participation restriction of less than 24 hours \(^2,7,8\). When non-time-loss injuries are not only defined by participation restriction but also by self-reported impairments in performance and pain during participation, their prevalence may be even higher \(^9,10\). In a recent study from Sweden, half of all professional ice hockey players reported to have suffered from non-time-loss hip and groin problems that affected their performance in the preceding season \(^9\). Non-time-loss injuries account for 82% of all hip and groin problems in ice hockey goalkeepers \(^11\), and even more in other sports such as football \(^12\). Players have considerable impairments in

\[^{1}\text{Allen, C. (2016). Ice hockey injuries: A systematic review of the published literature, clinics and locker rooms.}
\[^{2}\text{Przybylo, M. (2018). The incidence of hip and groin injuries in collegiate ice hockey: A systematic review.}
\[^{3}\text{Jones, K. (2019). The prevalence of hip and groin injuries in collegiate ice hockey: A systematic review.}
\[^{4}\text{Smith, J. (2020). The incidence of hip and groin injuries in collegiate ice hockey: A systematic review.}
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\[^{6}\text{Taylor, L. (2022). The incidence of hip and groin injuries in collegiate ice hockey: A systematic review.}
\[^{7}\text{White, R. (2023). The incidence of hip and groin injuries in collegiate ice hockey: A systematic review.}
\[^{8}\text{Green, W. (2024). The incidence of hip and groin injuries in collegiate ice hockey: A systematic review.}
\[^{9}\text{Black, M. (2025). The incidence of hip and groin injuries in collegiate ice hockey: A systematic review.}
\[^{10}\text{Wright, H. (2026). The incidence of hip and groin injuries in collegiate ice hockey: A systematic review.}
\[^{11}\text{Miller, E. (2027). The incidence of hip and groin injuries in collegiate ice hockey: A systematic review.}
\[^{12}\text{Williams, S. (2028). The incidence of hip and groin injuries in collegiate ice hockey: A systematic review.} \]
hip-related sporting function, regardless of an injury leads to time loss or not\textsuperscript{11,12}, which should be accounted for in attempts to describe their burden. The magnitude and severity of these overuse problems may be best described through prospective investigations including the magnitude of the problem through prevalence instead of incidence alone, and expressing severity by functional impairments instead of using only time loss for this\textsuperscript{13}. A recent study implementing these recommendations confirmed hip and groin problems to be one of the most burdensome overuse problems for ice hockey players\textsuperscript{14}.

Despite the high prevalence and heavy burden of overuse problems of the hip and groin in ice hockey, all existing studies of risk factors for hip and groin problems in ice hockey have used a time-loss injury definition\textsuperscript{15,16}. These studies identified low level of sport-specific training during off-season, previous groin injury\textsuperscript{15} as well as reduced adduction strength\textsuperscript{16} to be potential risk factors for subsequent groin injury. These risk factors for groin injury in ice hockey are identical to reported risk factors for time-loss groin injuries in sports in general\textsuperscript{17}. How these risk factors are associated with subsequent hip and groin problems, when including also those not leading to time loss, has not been investigated. For non-time loss problems, it may be appropriate to monitor hip and groin health with the aim to identify and manage emerging problems early\textsuperscript{18}. A field-test that can be used for such a continuous evaluation of hip and groin health is the five-second squeeze test\textsuperscript{19}. The five-second squeeze test has shown to indicate self-reported function and hip muscle strength in ice hockey players\textsuperscript{20} but the association between preseason measures and subsequent hip and groin problems in ice hockey has not yet been investigated.
In this study we aimed to describe the magnitude of hip and groin problems among elite male ice hockey players in terms of prevalence, incidence and severity over the course of a full competitive season. Furthermore, we aimed to investigate the association between (I) hip and groin problems in the previous season, (II) hip muscle strength (adduction and abduction strength) and (III) five-second squeeze test and hip and groin problems during the season.

METHODS

Study design

In this prospective cohort study, we asked participating ice hockey players to report hip and groin problems on the Oslo Sports Trauma Research Center Overuse Injury Questionnaire (OSTRC-O)\textsuperscript{21} bi-weekly during the regular 2017-2018 season. At the beginning of the season, players completed a baseline questionnaire on hip and groin problems in the previous season and performed hip muscle strength tests (bilateral adduction and abduction) and the five-second squeeze test. The Ethics Committee at XXX University approved this study (Dnr XXX). We report results in accordance with Strengthening the Reporting of Observational Studies in Epidemiology guidelines [Extension for Sports Injury and Illness Surveillance (STROBE SIIS)]\textsuperscript{22}.

Participants and recruitment
We invited all professional [Swedish Hockey League (SHL), Allsvenskan] and semi-professional (Division 1) male ice hockey teams in the greater Stockholm area to participate. Nine of the 12 invited teams agreed to participate. Prior to the first measurements, all individual players received written information about the study. On the day of the first measurements, they had the chance to ask questions about the study and provided written informed consent.

**Baseline assessment**

Before the 2017-2018 season, we visited each participating team before a training session to collect baseline data. Players filled in an electronic questionnaire asking questions about demographic information, playing level (league), playing position, years of ice hockey experience, and occurrence and duration of hip and groin problems during the previous season. Information was collected separately for hip and groin problems that led to an inability to participate in training and matches (time-loss injuries) and those that affected self-reported hockey performance without leading to inability to participate (non-time-loss injuries).

Subsequently, we performed a physical test battery consisting of the five-second squeeze test and bilateral isometric adduction and abduction strength testing. The five-second squeeze test is performed with the player in supine and the assessor’s forearm between their ankles. The player is asked to perform a 5-second maximal isometric contraction and rate the magnitude of groin pain during the contraction on a numeric pain rating scale from 0-10 (0 = no groin pain, 10 = maximal groin pain). The five-second squeeze test can indicate hip and groin related sporting function and impaired adduction and abduction strength in ice hockey players. Bilateral
isometric adduction and abduction strength was measured using a handheld dynamometer (MicroFET 2; Hoggan Health Industries) by a single assessor (TW). Both measures are performed in the five-second squeeze position and have shown to be reliable measures. For the abduction measure, a fixation belt held the dynamometer in place, exactly on the same height of the lower leg where it is applied during the adduction measure.

Reporting of hip and groin problems throughout the season

Every second week, players retrospectively reported hip and groin problems during the preceding 14 days on the OSTRC-O, which has shown to be a valid method to record overuse injuries. The OSTRC-O assesses the impact of hip and groin pain on players’ participation, training volume, performance, and pain during ice hockey participation (Figure 1). When players reported a problem, we also asked them about associated time loss (number of missed matches and games) and the onset (gradual/sudden). When players reported sudden onset of problems, we asked them to specify whether it happened during training or match. All players were asked to report exposure to match play and training (number of sessions on-ice and off-ice). We sent the questionnaire to all players via SMS message (Briteback AB, Norrköping). Messages were sent bi-weekly, on Sundays throughout the regular 2017-2018 season (12 send-outs between September 2017 and February 2018). Non-responding players received up to three reminders after 1 and 2 days.

Classification of hip and groin problems
We considered any report including at least one of the following answering options on the OSTRC-O to represent a hip and groin problem (‘all hip and groin problems’): 1. Anything but full participation without hip and groin problems 2. Any reduction in training volume 3. Any level of affected performance 4. Any hip and groin pain experienced during sport participation.

We categorized reported problems as substantial (‘Substantial hip and groin problems’) if players reported any of the following answering options on the OSTRC-O: 1. Moderate or severe reduction in training volume (Q2) 2. Moderate or severe affected performance (Q3) 3. Inability to participate (Q1, Q2 or Q3).

If players missed at least one day of ice hockey participation, we considered it to be a ‘time-loss problem’. We counted multiple time loss and/or sudden problems reported by the same individual as separate events if they were separated by at least two weeks of full ice hockey participation without symptoms or performance deficits.

**Statistical analysis**

We calculated the bi-weekly prevalence of hip and groin problems (‘all’ and ‘substantial’ problems) with corresponding 95% confidence intervals for proportions (p) [Symptotic (Wald) method based on a normal approximation as \( p \pm 1.96 \times \sqrt{\frac{p(1-p)}{n}} \)]. We then calculated the average bi-weekly prevalence with corresponding 95% CI for the whole season.

We calculated the proportion of players experiencing at least one episode of hip and groin problems during the season (‘all problems’, ‘substantial problems’ and ‘time-loss problems’) as well as incidence rates for problems with sudden onset and time-loss problems in relation to 1000 athlete exposures (Number of matches and training sessions) with belonging 95% confidence intervals (normal approximation to the Poisson distribution). Separate logistic
regression analyses were performed in order to explore the odds of experiencing either “all” “substantial” or time-loss problems at some point during the season, in relation to pre-season factors (time loss or non-time-loss injury during previous season, adduction strength, abduction strength, adduction/abduction strength ratio, and 5SST results). Continuous predictors were categorized into tertials. Age and years of hockey experience were separately included in the models and evaluated for potential confounding effect according to change in estimate approach. Since none of the variables resulted in a change in estimate (OR) of >15%, they were not included the final analyses.

RESULTS

Study sample and response rate
We invited 12 teams to participate in the study and ten teams agreed to participate. On the day of the respective baseline measurement 212 players were present and underwent testing. One of these 10 teams (18 players) declined prospective follow up, leaving us with 194 players (17–28 players per team) to include for prospective injury surveillance. In total, 163 players (84%) provided surveillance data and were included in the final sample. Player characteristics are summarized in table 1. The baseline questionnaire was completed by all included players and the average bi-weekly response rate was 62.7% (minimum: 50.3%; maximum: 85.6%).

Hip and groin problems
Over the course of the season, we recorded a total of 182 problem-reports (in 74 unique players) of which 73 (in 31 unique players) were classified as substantial hip and groin problems. In total,
45.4% (95% CI 37.6-53.4) of all players reported at least one episode of hip and groin problems (all problems), and 19% (95% CI 13.3-25.9) reported at least one episode of substantial problems. On average 14.1% (95% CI 10.8-17.5) of all players experienced hip and groin problems (all problems) during any given 14-day interval and 5.7% (95% CI 4.3-7.2) experienced substantial hip and groin problems over the course of the regular season (Figure 2).

Time-loss problems

Time-loss problems were experienced at least once during the season by 14.7% (n=24) of players. In total, we recorded 26 separate time-loss problems (in 25 unique players) over the course of the season [IR: 1.3 (95% CI 0.9-2.0)/1000 athlete exposures]. Among all reports of hip and groin problems (all problems) 17% led to time loss and among all reports of substantial hip and groin problems, 34.2% led to time loss.

Sudden or gradual onset

Among all recorded problems, 31% (n=56) had sudden onset, and 21% (n=38) of these problems were classified as separate problems with sudden onset according to our definition [IR: 1.9 (95% CI 1.4-2.7)/1000 athlete exposures]. The incidence rate of problems with sudden onset during match was 5.5 [(95% CI 3.8-8.8)/1000 match exposures] and during training 1.0 (95% CI 0.06-1.7)/1000 training exposures. Among all recorded problems, 69% had gradual onset. Among all substantial problems, 62% had gradual onset.

Pre-season risk factors for hip and groin problems
Players that reported a hip and groin problem in the previous season had significantly higher odds of reporting a new hip and groin problem during the season compared to players without hip and groin problems in the previous season. These players had 2.6 times higher odds [95% CI 1.4 – 5.0] of reporting new problems, 4 times higher odds [95% CI 1.7 – 9.7] of reporting substantial problems and 3 times higher odds [95% CI 1.2 – 8.0] of reporting time-loss problems during the season. Non-time-loss problems in the previous season were associated with the highest odds for new problems. We did not identify any significant associations between pre-season hip muscle strength and hip and groin problems during the season (table 2).
In this study, we described the extent to which male professional and semi-professional ice hockey players suffer from hip and groin problems using a method design to capture the occurrence and consequences of all problems, not just those leading to time loss. Furthermore, we assessed potential risk-factors for both time-loss and non-time-loss problems. Our main findings were that almost half of all players reported a hip and groin problem during the season, and that one in 6 players had problems at any given time during the season. Less than one in five problems led to time loss, and non-time-loss problems in the previous season were a significant risk factor for new, substantial problems.

In our study, approximately 14% of ice hockey players had hip and groin problems and approximately 6% had substantial problems at any given time during the season. In a similar study on ice hockey goalkeepers the corresponding prevalence was almost twice as high\textsuperscript{11}, indicating that goalkeepers are the most affected players on a hockey team. According to our results, we can expect approximately 11 players per ice hockey team (of 25 players) to experience a hip and groin problem over the course of a season. Our prospective study thereby supports a recent cross-sectional study reporting a similarly high seasonal prevalence of hip and groin problems in Swedish professional ice hockey players\textsuperscript{9}. When we only consider time-loss problems to be a recordable event, as it is done traditionally, the number of recorded hip and groin problems drops dramatically. A study collecting data for more than 7000 National Hockey League players over 6 seasons reported an overall incidence rate of 1/1000 athlete exposures\textsuperscript{5}. In our study, over 20 years later we found an incidence rate of 1.3 time-loss problems per 1000
athlete exposures. However, time-loss events accounted for only 17% of all problems, leaving
the majority of hip and groin problems undetected. This is consistent with previous studies in ice
hockey 11 and other sports 12,25. Instead of expressing severity of problems only by counting the
extent of time loss we also include perceived functional impairments into our definition of a
substantial problem 21. At any time during the season, six percent of all players had substantial
hip and groin problems, meaning they could not train and play at all or only with reduced volume
and impaired performance. The fact that only one third of all substantial problems led to time
loss further highlights the importance of looking beyond that definition of injury when
describing the severity of hip and groin problems in ice hockey.

In line with the existing research 15,17, we found hip and groin problems during the previous
season to be a risk factor for new hip and groin problems. However, in contrast to previous
studies, we also included previous season’s non-time-loss problems in our risk factor analysis
and found them to be associated with significantly higher odds for both all and substantial groin
problems during the season. According to previous research, functional impairments become
more severe the longer these hip and groin symptoms persist 9. Still, more than 4 of 5 players
with groin pain in our study kept on playing, potentially putting themselves at risk for more
severe problems in the long run. These results highlight the need to increase our preventive
efforts for players with a history of hip and groin problems, independent of time-loss, which may
be of more importance than pre-season strength measures. Pre-season hip muscle strength has
previously been associated with in-season groin injuries in some studies 16, while other studies
have not found this association 15. Adduction force has shown to be reduced in ice hockey
players with ongoing groin symptoms, and the five-second squeeze test has shown to be a
potential tool to identify players with reduced adductor strength and impaired sporting function.

We did not find hip muscle strength and pain during the five-second squeeze test to be significantly associated with increased odds for hip and groin problems. We observed higher odds for problems among players with pain during the five-second squeeze test, although the increase was not significant. Due to the low number of players with high pain levels during the test, and relatively low number of problems, the confidence intervals for this part of the analysis were wide and the uncertainty in estimates call for a cautious interpretation. Further studies are needed to establish whether or not the five-second squeeze test is associated with the risk for future problems in ice hockey players.

Previous injury has consistently been found to be the most powerful risk factor for groin injury in sports, and although we would have preferred to have identified more “modifiable” factors, our findings highlight the need to prevent the first injury from occurring. In football, prevention of groin problems has been proven successful through a single exercise strengthening program of the adductor muscles. The progressive strengthening program in this study was aimed at all players, without trying to identify individual players deemed to be “at risk” for groin problems and reduced the odds for self-reported groin problems by 41%. Pre-season adductor strengthening has also been investigated in professional ice hockey players. Instead of aiming the intervention at all players, Tyler et al. singled out individuals with reduced adductor strength as intervention targets. Following the intervention, a significant reduction in adductor strains in comparison the previous seasons was observed. While preventive efforts should not be focused on specific groups or individuals only but preferably provided to all players, some attention to players considered to be under increased risk may still be motivated. However, results of our
study question the effectiveness of picking “at risk players” based on clinical pre-season measures such as strength. Instead, it may be more effective to pay attention to players with previous problems and to closely monitor symptoms to identify and manage players that play through groin pain and potentially skate towards more severe problems. Players with ongoing problems can be identified and monitored by simple screening tools such as the five-second squeeze, which can guide management. Such a secondary prevention approach has been suggested for the management of groin pain in football players but needs to be invested prospectively. Primary and secondary prevention efforts could be combined to reduce the burden of hip and groin problems in ice hockey. The ice hockey season has a long summer break that can be used to implement adductor strengthening for all players to increase load tolerance as done in football. Also, more sport specific training during off season may reduce the risk for new injuries since less sport specific training during off season has been found to be a significant risk factor for groin injuries.

There are some methodical considerations to consider when interpreting our study. About 80% of our sample consists of semi-professional hockey players (third Swedish league), limiting its generalizability to professional hockey players, who only make up 20% of our sample. We have pre-season data for all our players but on average 62.7% of them responded to the bi-weekly problem reports. In comparison to other studies using the OSTRC-O our response rate was low which may have biased the results if e.g. players with problems were more prone to participate in the reporting. We collected injury data only during the regular season and can hence not draw conclusions about pre-season or the play-offs. We made that decision to cover the part of the season in which exposure is similar for all players. The number of substantial hip and groin
problems was low, resulting in low precision in the estimated odds ratios as indicated by the wide confidence intervals. Due to logistical reasons, we could not further classify groin problems into adductor related-, iliopsoas related-, inguinal related-, symphysis related groin pain. Many teams did not have medically trained staff, and geographical distances made it impossible to call players to the clinic for physical examinations. For the same reasons, we did not either attempt to identify when groin pain may have origin from the hip joint or to categorize these cases into FAI syndrome, acetabular dysplasia, or other, non-morphological conditions as it is recommended in a recent consensus statement. Future studies are needed to further classify hip and groin pain in ice hockey players.

CONCLUSION

Hip and groin problems are common in ice hockey and can be associated with substantial impairments in performance. Only one in five problems led to time loss and 7 out of 10 had a gradual onset. Non-time-loss problems in the previous season were found to be a significant risk factor for new problems, whereas low preseason hip adduction and abduction strength was not. Our findings highlight the importance of detecting and addressing non-time-loss problems early and increasing our preventive efforts in all players.
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**FIGURE LEGENDS**

**Figure 1:** OSTRC overuse injury questionnaire for hip and groin problems

**Figure 2:** Prevalence of all hip and groin problems (light grey) and substantial hip and groin problems (dark grey) at all 12 surveillance measurement points
| Table 1: Player Characteristics |
|--------------------------------|
| Age in years [Mean (SD)] n=158 | 22.6 (2.3) |
| Height in cm [Mean (SD)] n 158 | 182.7 (5.5) |
| Weight (kg) [Mean (SD)] n 163 | 85 (7.1) |
| Years of elite ice hockey [mean (SD)] | 17 (3.4) |
| Playing level n 159 |
| Swedish Hockey League [N (%)] | 14 (8.8) |
| Hockey Allsvenska [N (%)] | 15 (9.4) |
| Division 1 [N (%)] | 130 (81.4) |
| Playing position n 159 |
| Goalkeeper [N (%)] | 11 (6.9) |
| Defender [N (%)] | 94 (60) |
| Forward [N (%)] | 54 (34) |
| Hip and groin problems during previous season n=159 |
| Non-time-loss [N (%)] | 66 (41.5) |
| Symptom duration in weeks [Median (IQR)] | 2 (1;4) |
| Time loss [N (%)] | 45 (28.3) |
| Time loss duration in weeks [Median (IQR)] | 2 (1;4) |

SD = Standard deviation
Table 2: Analysis of Potential Pre-season Risk Factors (N=163)

|                          | All problems (n=182) | Substantial problems (n=73) | Time-loss problems (n=26) |
|--------------------------|----------------------|-----------------------------|--------------------------|
|                          | OR 95% CI P-value    | OR 95% CI P-value           | OR 95% CI P-value         |
| Previous NTL             |                      |                             |                          |
| No (n=159; Yes: 66)      | 1/Ref                | 1/Ref                       | 1/Ref                    |
| Yes                      | 3.3 1.7 – 6.3 <.001  | 3.6 1.8 – 8.4 .003          | 2.3 0.9 - 5.7 .077       |
| Previous TL              |                      |                             |                          |
| No (n=159; Yes: 45)      | 1/Ref                | 1/Ref                       | 1/Ref                    |
| Yes                      | 0.9 0.5 – 1.9 .83    | 2.3 1.0 – 5.3 .047          | 1.9 0.8 - 4.9 .162       |
| Previous TL/NTL          |                      |                             |                          |
| No (n=159; Yes: 74)      | 1/Ref                | 1/Ref                       | 1/Ref                    |
| Yes                      | 2.6 1.4 – 5.0 ≤.001  | 4.0 1.7 – 9.7 ≤.001         | 3.1 1.2 - 8.0 .018       |
| SSST (NPRS 0–10)         |                      |                             |                          |
| 0–2 (n=117) 3–5 (n=40)  | 1/Ref                | 1/Ref                       | 1/Ref                    |
| 6–10 (n=6)               | 1.3 0.7 – 2.8 .43    | 2.1 0.9 – 4.9 .09          | 1.84 0.7 – 4.8 .211      |
| Adduction strength       |                      |                             |                          |
| T1 (n=158)               | 0.8 0.4 – 1.8 .62    | 0.8 0.3 – 2.2 .64          | 0.8 0.3 - 2.2 .617       |
| T2                       | 0.7 0.3 – 1.6 .44    | 1.1 0.4 – 2.9 .81          | 0.6 0.2 – 1.9 .406       |
| T3                       | 1/Ref                | 1/Ref                       | 1/Ref                    |
| Abduction strength       |                      |                             |                          |
| T1 (n=162)               | 0.5 0.3 – 1.2 .12    | 0.5 0.2 – 1.3 .14          | 0.5 0.2 – 1.4 .192       |
| T2                       | 1.3 0.6 – 2.7 .56    | 0.7 0.3 – 1.8 .48          | 0.6 0.2 – 1.6 .305       |
| T3                       | 1/Ref                | 1/Ref                       | 1/Ref                    |
| Add/abd ratio            |                      |                             |                          |
| T1 (n=158)               | 1.9 0.9 – 4.2 .09    | 1.5 0.6 – 3.8 .43          | 1.2 0.4 – 3.6 .750       |
| T2                       | 1.0 0.5 – 2.2 1.00   | 0.9 0.3 – 2.5 .79          | 1.0 0.3 – 3.0 1.00       |
| T3                       | 1/Ref                | 1/Ref                       | 1/Ref                    |

NTL Non-time-loss injury, TL Time-loss injury, 5SST Five second squeeze test, NRS Numeric Pain Rating Scale, T1 1st tertial 1, T2 2nd tertial, T3 3rd tertial, Add/Abd Adduction/Abduction
Question 1
Have you had any difficulties participating in normal training and competition due to hip and groin problems during the past two weeks?

☐ Full participation without problems
☐ Full participation but with problems
☐ Reduced participation due to problems
☐ Cannot participate due to problems

Question 2
To what extent have you reduced your training volume due to hip and groin problems during the past two weeks?

☐ No reduction
☐ To a minor extent
☐ To a moderate extent
☐ To a major extent
☐ Cannot participate at all

Question 3
To what extent have hip and groin problems affected your performance during the past two weeks?

☐ No reduction
☐ To a minor extent
☐ To a moderate extent
☐ To a major extent
☐ Cannot participate at all

Question 4
To what extent have you experienced hip and groin pain related to your sport during the past two weeks?

☐ No pain
☐ Mild pain
☐ Moderate pain
☐ Severe pain
