

## Component 4 Performance Analysis- Hockey

### Centre Forward

Coping with the demands of a centre forward, means excelling in these characteristics:  
From Harbour Hockey coaching guidelines)

- Fast and agile with good acceleration and change of pace
- Good basic skills, including receiving, ball-carrying and shooting
- Ability to identify and execute the best shooting opportunity
- Vision and game awareness
- Constant movement
- Ability to put pressure on opposition defence
- Ability to use skills to force a PC or attacking free hit at the right time'

(16)

My coach (UKCC Level 2) stated that 'all of these characteristics are as important as each other in performing the best in a 70-minute match'

#### Demands and Details on hockey in General

(See Appendix)

'For example, as presented in the table below, the meters covered per minute for the various playing positions in elite men's hockey, elite men's soccer, Australian Rules football. This comparatively greater relative intensity appears to be also true for elite women's hockey, compared with elite women's soccer' (28)

Sport	Elite Men's Average Metres per minute	Elite Women's Average Metres per minute
Hockey	132-142	120-129
Football	120-130	110-114
Australian Rules football	113-124	

(28)

#### Components of fitness required for hockey, (centre forward) agreed by my coach

- 'Speed
- Reaction time
- Agility
- Balance
- Co-ordination
- Power
- Aerobic Endurance
- Muscular Endurance
- Flexibility
- Strength'

#### Arguably the 3 most important components are

- Speed- 'the maximum rate a person is able to move his or her body' (1). Needed to burst away from your defender, gain space to shoot or aid the build-up of an attack. *'Elite level athletes possess a high degree of all three speeds. Speed of foot/hand: This is overall quickness, explosive power, speed over a short or long distance, and agility of foot and speed of hand'* (7) My coach said 'if you have a high

degree of speed, especially as a forward, you will be extremely hard to mark and keep up with, this will also allow you to create your own shooting opportunities'

- Muscular Endurance- 'is the ability of a muscle or group of muscles to sustain repeated contractions against a resistance for an extended period of time.' (8)  
Needed to continuously use arm and leg muscles in order to control the ball, pass, shoot, tackle etc. *'While muscular endurance is important for any athlete, some sports such as basketball, hockey and soccer require a greater balance of speed and strength, and endurance'* (11) My coach said 'with muscular endurance you will be able to perform tasks later in the game the opponents won't be able to cope with, due to fatigue'
- Agility- 'is the physical ability that enables a person to change body position in a precise manner.' Helps changing direction at speed to lose your marker or out-skill your marker to create a scoring opportunity. I used agility because *'Improvements in speed and agility could make a huge difference on the hockey field whether you are a field player or a goalkeeper'*  
I believe agility and speed are equally important for a forward in hockey. However, for continuous use of these you must have good muscular endurance.

### Fitness tests

Fitness testing can identify strengths and weaknesses of athletes so coaches can target areas to improve. 'This is done by comparing fitness test results to other athletes in the same training group, the same sport, or in a similar population group.' (15) My coach suggested 'fitness testing is a great way of assessing people's abilities and match fitness within the squad'

- Validity: refers to how well a test measures what it is purported to measure (6)
- Reliability: is the degree to which an assessment tool produces stable and consistent results. (6)

These are important as they help results become comparable to others and replicated with accurate values. They aid testing what you're looking to test in the most effective way.

- **30m sprint: - (Tests speed)**

(See protocol and data in the appendix)

My Result	Against normative data
3.53s	Excellent

IES Teammates of similar position: - Tested on 01/012/17 at Rushmere astro

Name	Time (seconds)	Average	Difference (seconds)	Average Difference (seconds)
Forward 1 (16) Striker	4.5	4.49	+0.97	+0.97
Forward 2 (22) Right Midfielder	4.06		+0.53	
Forward 3 (32) Striker	4.93		+1.4	
Me	3.53		0	

My results are well above the other forwards in my team. This component is my strongest attribute; my performance potential is significantly better, enabling me to reach the ball before defenders and to sprint into space, therefore creating more opportunities for myself and teammates.

- **Validity:** tests a straight sprint; this replicates the role of a striker, realistically the furthest you'd have to sprint is 30m. However, the test isn't ideal, as sprints can vary in length. More information could be gained by doing varied lengths of sprint tests. **Reliability:** I followed the protocol correctly allowing me to repeat the test, getting accurate results from it. I used the same people timing, the same measuring equipment, surface of the ground and same weather conditions. Following the protocol correctly meant I sprinted from start to finish. However, results may be affected by human error in the timings. This could ideally be improved using light gates. Another variable is my motivation. I could make it more reliable by having the same reward when the task is completed (positive reinforcement from my coach).

- **Body Squat test**

(See protocol and data in the appendix)

My Result	Against normative data
45	Good

(12)

IES Teammates of similar position: - Tested on 01/012/17 at Rushmere astro

Name	Squats	Average	Difference	Average Difference
Forward 1 (16) Striker	45	45	0	0
Forward 2 (22) Right Midfielder	43		-2	
Forward 3 (32) Striker	47		+2	
Me	45		0	

My results for muscular endurance was average in comparison to the rest of my teammates, which is useful, as a forward in hockey rotation occurs, in theory you should have the same Pitch: Rest ratio. My coach said 'this is completely true, hence why if you want to have more pitch time your muscular endurance must improve'

- **Validity:** The squat test is valid as it tests the muscular endurance in my legs, specifically my quadriceps. This is valid as when dribbling you are in a squat position in order to keep control of the ball. My coach said 'this test is perfect for hockey as you are in a squat position a lot as a striker, whether that be dribbling, being in the 'D' for deflections or receiving a pass' My coach said this after I stated that muscular endurance will aid me in repeating similar skills in hockey essential for the game. **Reliability:** Using correct test protocol I ensured reliability by maintaining equal rest before each test, keeping the same leg position in the squat until fatigue. An assistant judged the accuracy of my squat depth. The only variable that may alter is my motivation or lack of assistant. I would ensure I conducted the test on a day where I felt motivated to do well, I was highly motivated on test day. A problem is there is no real way of measuring motivation. Without the assistant my judgements and number of squats may be incorrect.

- **Agility- T-test: -**

(See protocol and data in appendix)

My result	Against Data
11 seconds	Average

Name	Time (seconds)	Average
Forward 1 (16) Striker	8.5	
Forward 2 (22)Right Midfielder	9.00	9.5
Forward 3 (32) Striker	9.5	
Me	11.00	

IES Teammates of similar position: - Tested on 01/012/17 at Rushmere Astro

All my teammates scored better than me, meaning I scored poorly in comparison, I know that this is the section that needs addressing the most. Unfortunately, I couldn't find results for elite hockey players but could find results for elite football strikers, where the average result was '8.3' (14) seconds. I can still use these results as strikers need similar levels of agility in football and hockey.

Validity: It tests your change of direction at speed, needed when you track players and tackle them.

Reliability: I followed the protocol correctly, however human error can cause inaccurate results. I made sure that I ran in a straight line towards all of the cones and touched all of cones with my feet to make sure I was travelling the required distance. Also the conditions of the floor and footwear have to be the same as the last time it was conducted or the test may be easier or harder to complete depending on the changes made.

My coach said that 'Your speed was your strongest attribute so you need to make sure you maintain this. A slight improvement is required in muscular endurance as this will give you the edge over your teammates and opponents. Finally, your agility needs huge work as you are way behind your teammates and makes it easier for opponents to dribble past you and mark you'

After discussion with the coach, I will be doing Agility training 6 days a week as this was the weakest result of them all by far (I will have a rest day as I don't want to use the principle of overtraining and cause injury). I suggested to my coach I would do SAQ training, as not only will this maintain if not improve my speed it will also vastly improve my agility as the frequency and time I do it for, I suggested 20 minutes, will really help my adaptations to happen fast, and the rest day will aid recovery and improvement. My coach added 'It sounds like an effective plan. You can increase the time you train for as time goes on so your body starts to adapt, but keep the intensity to same (13 on the BORG RPE Scale) as you don't want to be too fatigued to train the next day'

My aim for the agility run is under 10 seconds to be nearly level with my teammates, this target is realistic but challenging. This will allow me to use my agility more effectively to dribble past defenders at a greater speed. However, I cannot be sure that the teammates times are reliable because I don't know if they followed the same protocol as I did correctly and how seriously they took it, i.e. did they really try their hardest?

I can measure improvement by comparing the results I score in the three tests to previous results using the SMARTER setting principles. The effect and improvement in my agility will make me a more favourable forward in comparison to my team mates allowing me to beat defenders more easily, changing direction at speed and giving them less time to react.

Agility will also allow me to change my body position quicker in a goal scoring opportunity particularly from rebounds. My coach agreed 'It will make you a more complete forward in terms of goal scoring and chance creation, for the reasons you already stated. In addition to the fact your speed was already strong will make your agility improvement more effective and noticeable.'

## **Performance Analysis- Tactical Component**

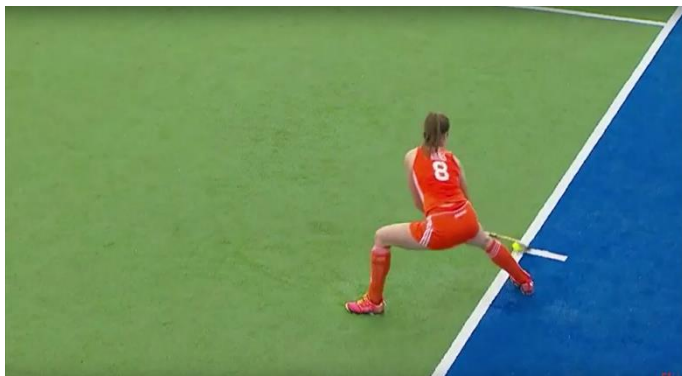
### **Attacking Short Corners**

A short corner occurs when an infringement of the rule occurs within or just outside the 'D'. Attackers wait outside the 'D' to receive the ball from the injector, they then can create a goal scoring opportunity. According to <https://www.ncaa.com/stats/fieldhockey/d2/current/team/452> the average team gets 8 short corners per game.

### **Rules of short corners**

**(See Appendix)**

### **Straight Strike Scenario**



1. The injector pushes out the ball to the person at the top of the 'D'. This requires a high degree of pace allowing teammates enough time to shoot before the defenders can impede the shot.



1. The recipient of the ball has to take a touch into the 'D', an effective first touch creates the time to shoot, the touch should be as far in the 'D' as possible reducing the time for defenders to prevent the shot.



2. The ball is struck with pace at the goal and it isn't quite on the floor so that it makes it hard for the defender on the line and goalkeeper to stop it going in.

(17)

### Strengths of the straight strike:

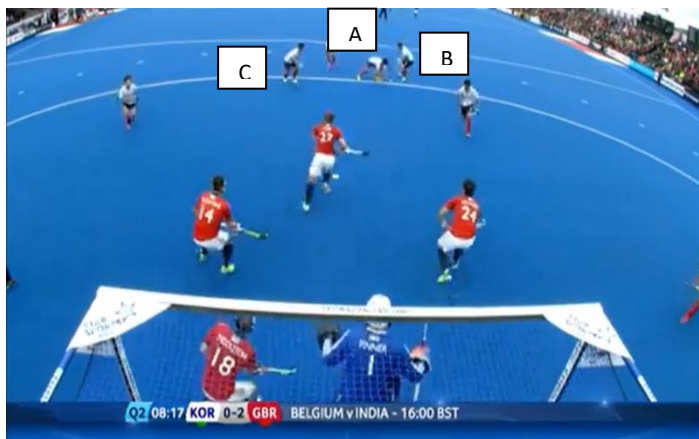
- I would say it gives the defenders and goalkeeper little time to react ensuring time to get a successful shot away.
- It's a very basic routine, involving less stages and therefore less chance of going wrong, increasing the chance of a goal
- It also creates the opportunity for deflections and rebounds as the goalkeeper is likely to knock it into the 'D' again if they save it.

### Weaknesses of straight strikes

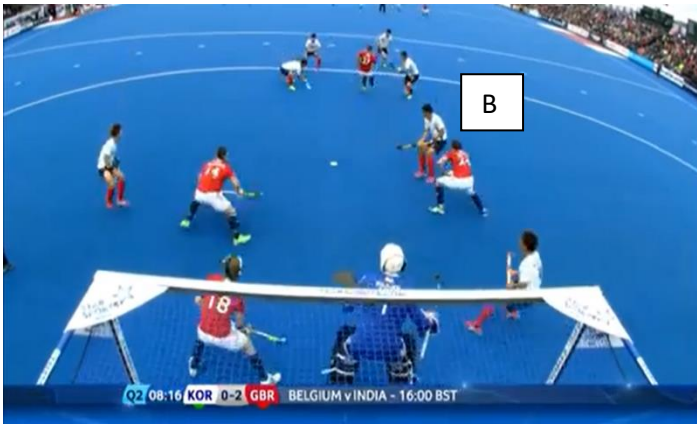
- The routine is basic and can become predictable and therefore easy to defend against.
- Routines can be less predictable and can create more of a clear goal scoring opportunity compared to a straight strike.
- Straight strikes have to be hit below the backboard, meaning there is less space to score in and makes it easier for the goalkeeper as you have less to aim for.

### Adapting to changing circumstances

Reasons to change a straight strike tactic could be it is predictable and ineffective or because of a fast number one defensive runner who would block it. An alternative option is to do what the Koreans did against Great Britain, they involved more passes which made it more complex to defend.



Person A stops the ball for person B, who fakes to shoot and slips the ball to person C. This deceives the defender, leaving C a lot of space and a goal-scoring opportunity. Person A can opt for a straight strike or drag flick, however as he is being closed down and player C has adopted a good position he opts for the pass due to new scenario.



Instead of shooting person C passes the to person B, who has advanced past the defender as the scenario has changed again. This gives a 5 on 3 overload and makes a goal more likely.

The attacker draws in two defenders, who try to block his shot, this gives him the option to pass as well. Player B shoots and scores.

This routine is good because it is extremely complex and unpredictable and this makes it hard to defend.



The routine is also effective due to the player's ability to change routine quickly when adapting to different scenarios. For example, they may see that the GB defenders commit to blocks very easily so slipping through person B will remove them from the current phase of play.

My coach concurred and added that 'the speed of the team makes it very hard to defend once an overload has been achieved.'

<https://www.youtube.com/watch?v=ZrLxvZKvAk>



My team's short corner statistics compared to elite teams-Rushmere Astro, 2017/18 season  
vs NCAA Division 2, 2017/18 season

Team	Number of short corners	Conversion rate	Conversions into goals
IES Men's 3's	48	25%	12
Assumption	161	13%	21

(18)

My team's conversion rate is greater than the elite team, possibly because of the fact that the standard of goalkeeping and defending at the elite level is higher, meaning at our level teams have time to opt for the most powerful straight strike. Whereas this option is restricted in elite play and other routines have to be devised. My coach agreed 'that's why less goals are being scored'.

The Percentage scored may be down to other variables, the strength of straight striker and the difference in short corners awarded for both teams. This would affect the statistics, if my team has an effective shooter striking the ball then the statistics are going to be higher than your normal amateur team so my team may be an anomaly. The other point is that the fact we have had less short corners than the Elite team means that once again results may not be accurate, maybe the first few short corner goals were down to luck, so as my team gets more short corners the conversion rate may drop significantly.

The main area for development is the variety in short corners as 9/10 my team will straight strike, this therefore makes the team predictable and therefore short corners easy to defend. I suggested to improve we should have a meeting to devise new routines, then set about performing them in training with a walk through, then fully go through without opposition, then add defenders who don't know which routine out of multiple routines is going to be performed to test its effectiveness. We can then set a target of short corners scored next season, let's say 30, and then measure whether we have hit that target by measuring goals scored from short corners. My Coach Agreed with this and said it was 'a good idea and should be conducted regularly'

There are many options at different times as the scenario is constantly changing. My coach said 'If the team can learn to adapt to changing scenarios then they will be extremely hard to defend against, ways to change the scenarios are by drag-flicking, fainting, passing shooting and dribbling.' I think that if the defensive team are reduced to three outfielders back, we should opt for a routine to utilise the extra man and have him free on the post to score. I said 'If the opposition have a fast number 1 runner then you may have to come up with a routine to remove him from the scenario so you have a clear line towards goal.'

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### **Appendix**

‘Hockey is an Olympic sport played by both men and women. Although referred to as *field hockey* in North America, the official name for the sport, used worldwide and by the International Olympic Committee, is *hockey*. The game is played on a rectangular pitch measuring 91.4 by 55.0 m and consists of two 35 min halves with a 10 min break for half-time.

Each team consists of 11 players on the pitch, including the goalkeeper. In addition, there are 5

substitute players for each team, and the number of substitutions that can be made during a game is unlimited. For international matches, it is now common for teams to make approximately 20 to 30 substitutions per half of a game, which is a considerable increase from 5 to 10 years ago. Furthermore, the range in individual player game time is typically between 30 and 70 min, with the mean positional game time being approximately 45 to 55 min for elite competition. However, it is common for the attacking positions to be substituted more often and have less playing time than for the defending positions (table below). The physiological requirements of contemporary hockey involve a highly developed aerobic system, numerous high-intensity running bouts, and frequent sprint and agility efforts for both the men’s and women’s game (Gabbett 2010; Spencer et al. 2004). Although the mean playing time in

hockey is considerably shorter than other field-based team sports such as soccer and Australian

Rules football, the relative intensity of the game (as indicated by the meters covered per minute) is typically greater.’ (28)

### 30m sprint:

The test involves running a sprint over 50 meters with the final 30 meters being measured for time. The test must be completed outdoors on a non-slippery surface. The timer should remain the same on every attempt of the experiment. The starting position needs the participant to be standing and avoid rocking movements behind the line. When the athlete passes the 20m cone the timer should be started and stopped when the participant passes the 50m mark the timer should be immediately stopped. (2)

Gender	Excellent	Above Average	Average	Below Average	Poor
Male	<4	4.0 - 4.2	4.3 - 4.4	4.5 - 4.6	>4.6
Female	<4.5	4.5 - 4.6	4.7 - 4.8	4.9 - 5.0	>5.0

(For 16-19 year olds) (3)

### Body Squat:

This test requires the athlete to complete as many squats as possible with no rest.

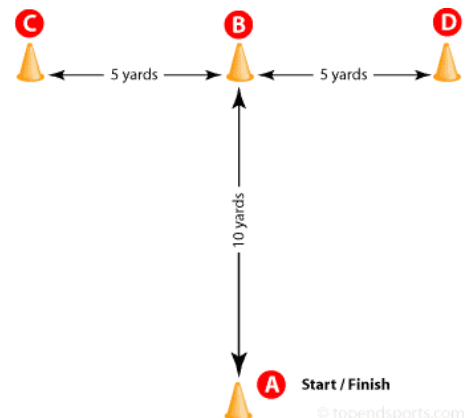
- The athlete [warms up](#) for 10 minutes
- The athlete stands in front of a chair, facing away from it, with their feet shoulder width apart
- The athlete squats down lightly touching the chair with their backside before standing back up and repeats this sequence of movements until they are unable to continue
- The assistant counts and records the number of successfully completed squats

Age	18-25	26-35	36-45	46-55	56-65	65+
Excellent	>49	>45	>41	>35	>31	>28
Good	44-49	40-45	35-41	29-35	25-31	22-28
Above average	39-43	35-39	30-34	25-38	21-24	19-21
Average	35-38	31-34	27-29	22-24	17-20	15-18
Below Average	31-34	29-30	23-26	18-21	13-16	11-14
Poor	25-30	22-28	17-22	13-17	9-12	7-10
Very Poor	<25	<22	<17	<9	<9	<7



T-test:

four cones as illustrated in the diagram above (5 yards = 4.57 m, 10 yards = 9.14 m). The subject starts at cone A. On the command of the timer, the subject sprints to cone B and touches the base of the cone with their right hand. They then turn left and shuffle sideways to cone C, and also touches its base, this time with their left hand. Then shuffling sideways to the right to cone D and touching the base with the right hand. They then shuffle back to cone B touching with the left hand, and run backwards to cone A. The stopwatch is stopped as they pass cone A. (9)



**Excellent** < 9.5

**Good** 9.5 to 10.5

**Average** 10.5 to  
11.5

**Poor** > 11.5 (10)

Rules of short corners

‘A penalty corner is awarded:

- for an offence by a defender in the circle which does not prevent the probable scoring of a goal
- for an intentional offence in the circle by a defender against an opponent who does not have possession of the ball or an opportunity to play the ball
- for an intentional offence by a defender outside the circle but within the 23 metres area they are defending
- for intentionally playing the ball over the back-line by a defender...

(13)

### **Procedure of short corners:**

‘Taking a penalty corner:

- the ball is placed on the back-line inside the circle at least 10 metres from the goal-post on whichever side of the goal the attacking team prefers
- an attacker pushes or hits the ball without intentionally raising it
- not more than five defenders, including the goalkeeper or player with goalkeeping privileges if there is one, must be positioned behind the back-line with their sticks, hands and feet not touching the ground inside the field...
- the other defenders must be beyond the centre-line
- until the ball has been played, no attacker other than the one taking the push or hit from the back-line

is permitted to enter the circle and no defender is permitted to cross the centre-line or back-line...

f. a goal cannot be scored until the ball has travelled outside the circle...

g. for second and subsequent hits at the goal and for flicks, deflections and scoops, it is permitted to raise the ball to any height but this must not be dangerous...

h. the penalty corner Rules no longer apply if the ball travels more than 5 metres from the circle.' (13)

## **Performance development programme**

### **Introduction:**

I have chosen to target agility, as that was the component I scored lowest, doing the T-test, against normative data and the data of my teammates, I had the slowest time. I scored 11 seconds; my target is to improve my time to 10 seconds so I score above the average of the rest of my teammates. I said to my coach (UKCC Level 2) agility is an essential part of being a great hockey player, especially as a forward as it helps on and off the ball skills, allowing me to make multiple leads for the ball, making me hard to track by defenders. It also aids my dribbling, especially when I want to wrong-foot my opponent by changing direction effectively at a high speed. My coach added 'this is all correct and contributes by also allowing you to adapt to the ever-changing scenarios of the ball in and around the attacking third'.

### **Planning**

#### **SMARTER Targets**

I will use Smarter targets because 'when you set specific, measurable, achievable, realistic and time based goals you are more likely to achieve them. That's because it'll attract focus and action. It'll also help with your development and review.' (25)

**Specific-** 'training must be relevant to the aspect you are trying to improve' In my case I am trying to improve agility for hockey so short burst sprints agility training is appropriate, for example I will use the X-Drill, L-Drill and 12-meter shuttle.

**Measureable-** 'you have to have a clear knowledge on when you have achieved your target' in my case when I reach a time of 10 seconds, I will measure this by using my fitness tests to verify my results.

**Achievable-** 'by performer, coach and manager'(1) in my case I am able to access all equipment and facilities required for training and testing.

**Realistic-** 'Challenging but within the capability of performer' (1) This means the targets should be based around previous results and be able to be reached when I push myself.

**Time bound-** to have an end date, at the end of the 8-week programme.

**Evaluated-** 'by coach and performer' (1) my coach and I have agreed the goals are suitable.

**Recorded-** I have a suitable method for recording my results and data

### **Principles of Training**

My coach said that 'You should use the principles of training because this is the way in which your improvements will be at their optimum, as it targets all the specific aspects of fitness you need for your certain sport and the ways in which to make improvements to your sport their maximum and avoid injury or severe fatigue'

**Specificity** – ‘the quality or state of being specific’ (19) in my case this means making the training specific to hockey, hence why my training involves many changes of direction to mimic ball movements.

**Progressive Overload/ FITT Principles-** ‘increasing the difficulty of the training slightly each week in order for your body to adapt or improve.’ I will do this by applying the FITT principles, by instead of training once a week as in the first sessions training twice a week. My coach also said ‘don’t forget to apply the other three FITT principles as they are equally important. You could also up the intensity of your training by upping your RPE and the repetitions you do, thus increasing the time, and maybe even alter the agility drills to vary the type you do. Not just to improve but also to prevent tedium- this is known as adding variance to your training.’

**Overtraining- Variance-** changing your training so it isn’t the same every week, this helps prevent tedium. I will do this by varying the drills I do every week.

**Rest and recovery-** leaving a suitable amount of time to allow all of my damaged muscle fibres to repair themselves and get bigger (hypertrophy of muscles). However, atrophy of muscle can occur when not training at a high enough intensity, long enough, or not frequently enough. My coach agreed, saying ‘you have to make sure you do all of these things to prevent reversibility. When doing a session, a week you need to leave a week to recover from this particular session, as well as leaving other time to recover from the other training sessions you do in the week.’

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Upper Body and leg Exercises, Agility Training Session	Upper Body and leg Exercises, Hockey Training	Upper Body and leg Exercises, Football training	Upper Body and leg Exercises, Football Match	Hockey Training	Hockey Match	Rest Day

Typical Weeks Physical Activities

**Individual needs-** training has to be suited to my current standard in the component I am training, as well as the sport and position I play, my age and gender. My coach said ‘In addition to this I should have an assistant to make sure that you don’t train too hard’. So when training I must be aware of my own ability and therefore not make training as demanding as I would like for the first few weeks.

### **Methods of Training**

**SAQ training-** ‘SAQ Training is Speed, Agility and Quickness Training. This method of training aims to improve an athlete's multi-directional movement by reprogramming their neuromuscular system.’ (20) ‘This type of training is very beneficial as it helps to improve your power in lateral, linear, horizontal movement, ground force reaction time, brain signal efficiency, spatial awareness and motor skills. It also looks to improve the acceleration of



your legs and arms as well as being able to slow it down.’ (21) ‘All athletes can benefit from improved balance, quicker feet, and a faster reaction time, and this is exactly what Speed, Agility, and Quickness (SAQ) drills help you achieve.’ (22) As training increases I would expect to see improvements in my reaction time, speed, balance and quicker feet, my coach agreed ‘this means your overall agility should increase’.

**Agility Training-** ‘Speed and agility training drills are designed to work all your leg and core muscles, as well as the tendons in your body. It is important to train at a level that is equal to your game intensity to help increase your performance and to minimize injury.’ (23) “Agility training incorporates components of learning, focus, balance, and coordination,” says study co-author Erica M. Johnson, Ph.D. (24) I would expect my balance, speed and reaction time to decrease. My coach said ‘you should do all of these things in order to maximise the agility progress made using specific drills and overload, however vary the drills so skills don’t become too learnt and affect drills’.

### **Standard Exercises in both SAQ training and agility training:**

(See Appendix for protocols)

### **Fitness Testing**

‘Of the many benefits of fitness testing, the most important is to establish the strengths and weaknesses of the athlete. This is done by comparing fitness test results to other athletes in the same training group, the same sport, or in a similar population group.’ (31)

**505 Agility Test-** ‘The 505 Agility test is a test of 180 degree turning ability. The test may also be adapted for sport specific testing by having the subject dribble a soccer ball or hockey ball though the course, or bounce a basketball.’ (26) At the start and at the end I will need to make sure my protocols are the same as well as conditions such as weather and footwear, making the test reliable. I will do the test 3 times to get an average and account for any anomalies. My coach said ‘This is a valid test for agility as it can be applied to hockey and tests balance, speed and sharp changes of direction, all that can be accounted for in hockey.’

**T- test-** ‘The T-test is a useful agility test for the assessment of multidirectional movement (forward, lateral, and backward). It is a simple test to administer and does not require much time or investment in supplies.’ (27) I am using the T-test because this test accounts for changes in every direction, which is an essential part of being a forward in hockey due to the changing movements of the ball in every direction. My coach agreed ‘unfortunately, this test fails to truly measure your reaction time which is another essential component of agility, also the course is set so you are not reacting to a change in direction you already know which way you are going to turn, meaning it becomes a bit predictable’ so lacks ecological validity.

**32m Shuttle-** In research I found out that the 32m shuttle test is a test specifically designed for hockey forwards, as it accounts for you sprinting one third of the pitch. My coach added ‘That is exactly why the test is suitable and this is a great test for speed as it tests flat out

sprinting as well as reaction time, both essential components in agility.’ However, it fails to offer tests of balance and change of direction at speed.

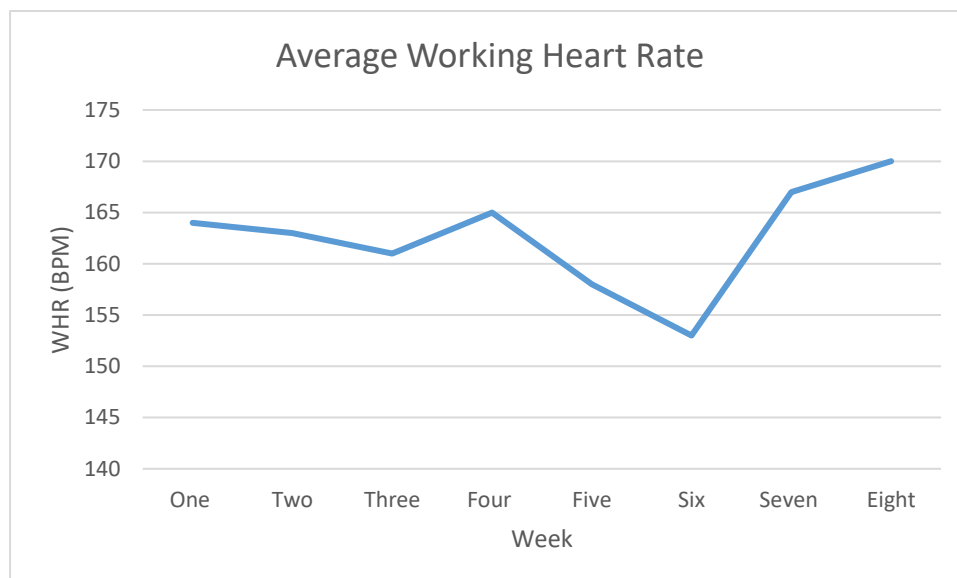
## **Performing and Recording**

I am partaking in an 8-week programme to improve my agility, I will also be doing the fitness tests 3 times over: once at the start, once after 4 weeks, and once after 8 weeks. These can be used to assess training.

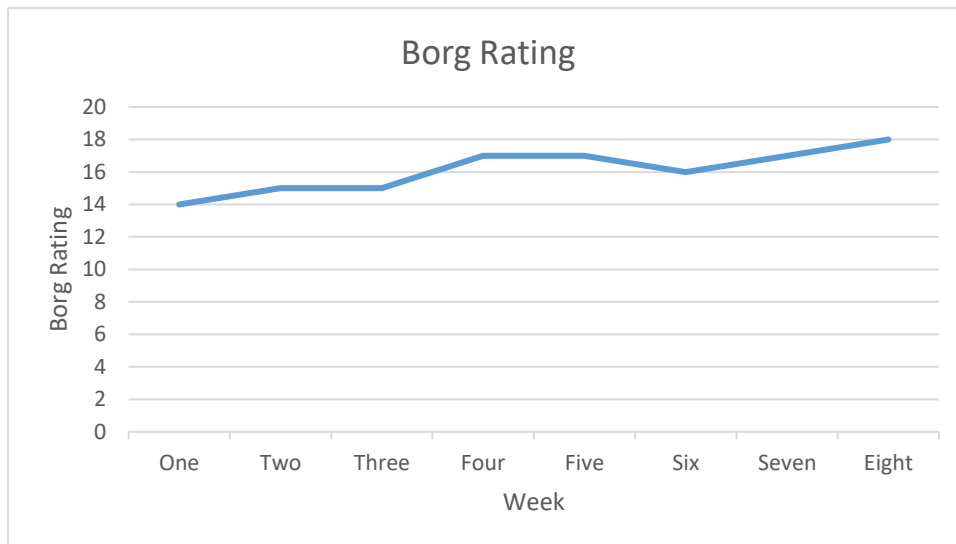
**SEE APPENDIX FOR FITNESS TEST RESULTS AND WEEKLY TRAINING LOG**

## **Review**

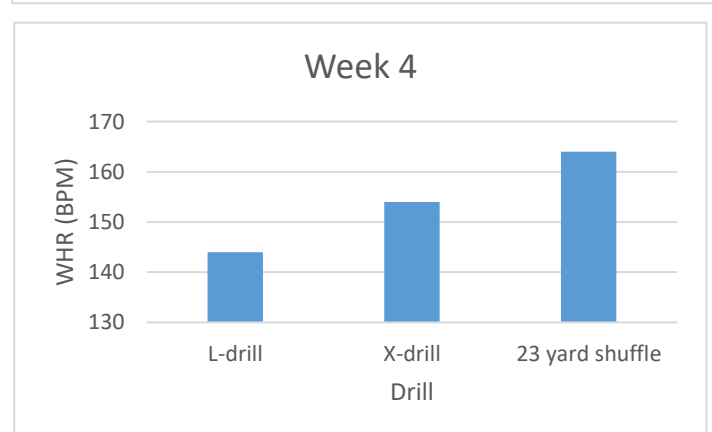
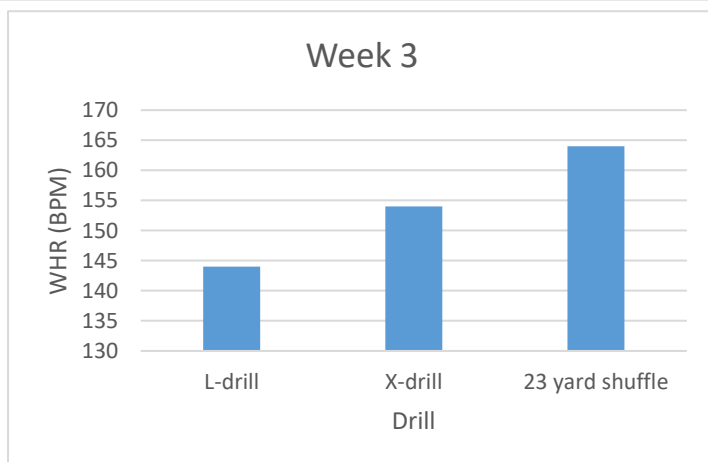
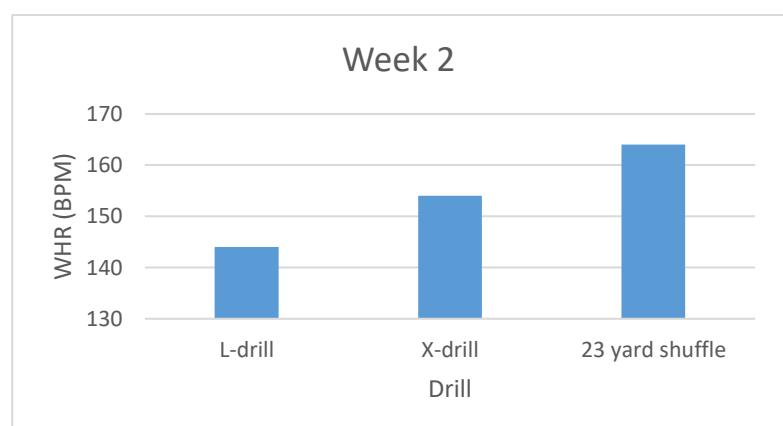
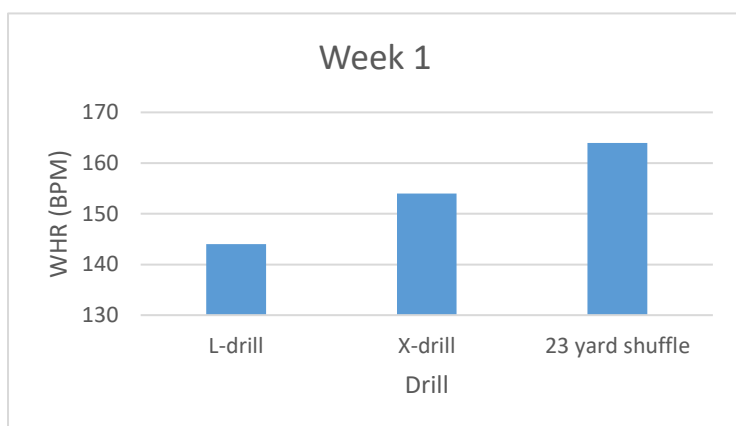
I am now going to evaluate the data collected. Comparing them on a week-by-week basis and seeing whether the trends or patterns can help to explain results and changes, and whether the Borg ratings and Heart rates correlate with adaptations made.



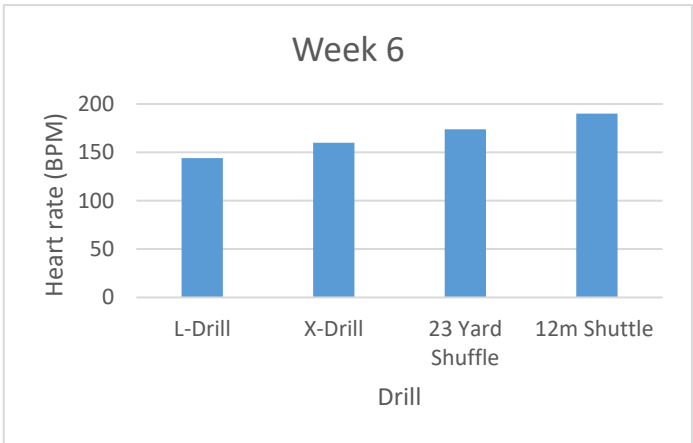
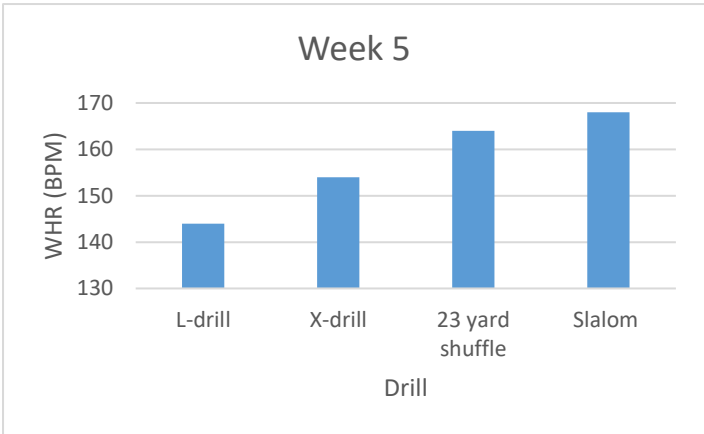
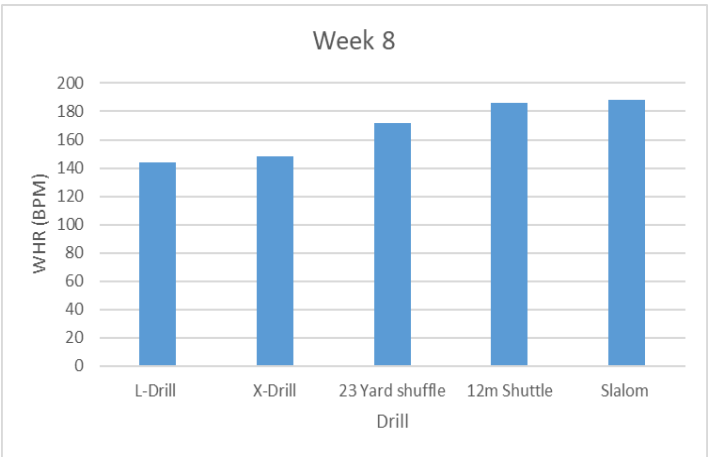
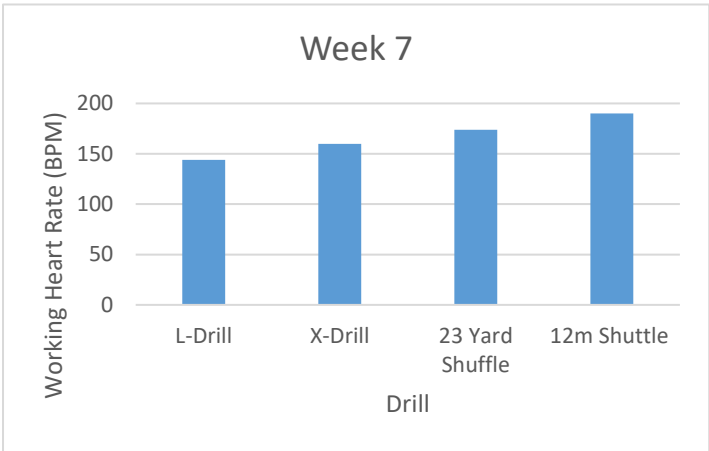
This graph shows that my working heart rate was fairly constant over the 8 weeks except for week six. This could be due to the fact that as I mentioned in my evaluation ‘this may be due to the fact that the weather wasn’t as hot as the previous weeks so I didn’t struggle as much’. If I were to draw a line of best fit on the graph then it would show a gradual increase of my working HR, which would agree with my borg rating which also showed a gradual increase.



This borg rating graph has the same sort of pattern as the heart rate graph, this suggests that as the training went on I maximised the intensity at which the training was conducted and thus increase the adaptations. The reason it slowly increased may be due to the fact that I realised my limit and that I could push it slightly further.



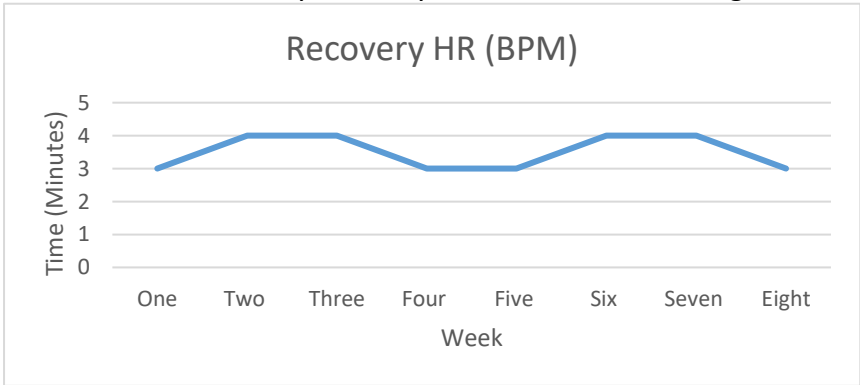
From week 1 through to week 4, all heart rates for drills are similar. This suggests that either I did not give myself the appropriate work rest ratio time's in-between drills or the intensity at the end of the session was always increased



and was closer to my maximum threshold.

From this data a likely conclusion is for all of the 8 weeks in the programme the increase in working heart rate is down to fatigue from Previous drills. This can be proven by the week 8 in the fact that the slalom drill is an addition to week 7 and the working heart rate of slalom is slightly higher.

The recovery heart rate graph shows a discrepancy in patterns with a fluctuating up and down line. My recovery heart rate is at its lowest peak at the first week, this is most likely because I was not working as hard as I could due to the fact the training was new to me so I was unsure what my intensity should be. This is changed in the next two sessions as my



recovery rate takes longer, suggesting the intensity was more suitable to the training I was doing. However, the dip in recovery rate for the next two weeks can be explained by the fact the intensity for these two

weeks dropped, or potentially down to the fact I got fitter so the recovery heart rate did not take as long. As you can see for the final week, the rate drops once more.

My fitness test results improved; this is due to the principles of training I have used but there is also some science behind it. My neuromuscular patterns will develop, which can link to specific sports movements, hence why the tests had improved as the speed of neuromuscular transmission for each test had increased as pattern was known. Muscular hypertrophy will have occurred to muscles such as the gastrocnemius and hamstrings, meaning I will have more strength in these muscles. My coach agreed and added 'thus improving agility as the speed and strength of this contraction will have increased.' This is due to additional muscle adaptations when tissues are repaired.

### **Evaluation**

Test	Score (Before Programme)	Score (4 weeks in)	% difference- before to week 4	Score after week 8	% difference- before to week 8	Total Difference (s)
505 Agility	2.80s	2.60s	7.7	2.45s	14.0	0.35
T-test	11.75s	11.40s	3.0	11.18s	5.0	0.57
32m Shuttle	10.65s	10.00s	6.5	9.89s	7.7	0.76

At the start of this programme I set a goal to reach a time of 10.0 seconds in the 32m shuttle test. After completing the 8-week training plan I repeated my original tests. My improvement shows the effectiveness of this program and that I met my achievable goals of my speed and agility. My coach stated that 'An overall improvement of 7.7% over a short period of time shows that the training was extremely effective over an 8-week program, made even more so impressive by the fact that the score went up by 6.5% in just 4 weeks.' What my coach failed to comment on was the fact that the improvement was only 1.2% between week 4 and 8, this could be explained by the fact that my recovery process may have altered in these weeks. This would all have been caused by the agility training, which the strength of the hamstring and gastrocnemius increasing and hypertrophy of these muscles.

The 505 test was particularly effective with similar percentage improvement in the four-week intervals. This is likely to be due to the fact that every time this test was conducted first, meaning the other tests improvements may be reduced down to the fatigue factor. My coach agreed 'it was correct to do the tests in the same order each time as this decreases the variables involved in different repeats of the tests. However, the other tests improvements may be reduced down to the fatigue factor' This is likely to be due to the fact that the tests are all anaerobic and lactic acid can build up, also without leaving time for the fast alactacid component to fully recover within the 3 minutes.

Although the tests all do not fully simulate the agility required in a hockey match they do all mimic the sorts of tasks you will have to display on the hockey pitch. With 3 tests having improved results, it shows this 8-week Performance Development Plan was effective. My coach said 'This helps improve my performance on the pitch, as you will be able to beat defenders with more ease with more efficient, quicker changes or direction, reducing their reaction time and therefore making it harder for them to tackle you'. Also within the 'D' it will allow me to change my body position at a greater speed, allowing me to react more quickly to a loose ball, thus increasing my chance of scoring. My coach said 'On the defensive press side of things, when the opposition decides to transfer the ball you are able to follow the direction of the ball more easily and therefore hinder their progress forward by blocking their passage of play.' During matches I have had an increase of 10% more successful take on from 62% to 72%, thus showing the importance of an improved agility.

I can now build and further improve my agility and general performance. Having been through the 8-week programme I can now set up more Accurate training zones because I have previous heart rate data, which allows me to have a more in-depth knowledge on what, would be most a most beneficial intensity for me to train at. My coach said 'This may also result in your heart rate zones changing and will allow me to monitor heart rate after each drill to ensure your intensity is appropriate' Having a tapering week may be beneficial before training with increased zones, as it will give my muscles enough time to fully recover.

After re-setting my training zones with a threshold test I have carried on my training. Applying the principles/ methods of training and further improving my performance.

I need to make sure that I stick to this programme and have appropriate recovery strategies to prevent injury and reversibility. My coach who suggested that 'Make sure you do not train too hard or else this ca result in injury or extreme fatigue, making other sessions hard to complete and increasing reversibility' backed this up.

**Total word count (Excluding titles, quotes and Tables): 3480**

## **Appendix**

### **Weekly Training Log**

**Week 1**

**Date: 12/06/18**

**SAQ Training**

#### **Warm up:**

Pulse Raiser: Gentle jogging, skipping, cherry picking, side steps, cross overs

Dynamic stretches: lunging, squats, heel flicks, leg swings, calf walk

#### **Training:**

Exercise	Repetitions	WHR
X-Drill	5	154
L-Drill	5	162
12 Meter shuttle	5	176

Repeat for 1 Set. 15 second rests between each repetition.

#### **Cool Down:**

WHR:170

Gentle jog and static stretches for all different muscle groups

#### **Recovery HR (Minutes)**

- 1. 135**
- 2. 95**
- 3. 60**

**Borg Rating: 14**

#### **Evaluation:**

In evaluation of the session I felt the activity was demanding and I was using the right borg rating for this type of training (interval). The weather was humid which made it harder as my heart was having to work faster as the blood was thicker due to loss of liquid, I didn't consume any water in the session. My footwear didn't help my training as I fell over a few times due to lack of grip, so as well as bringing a water bottle next week I will wear shoes with a better grip. The recovery time was estimated which means there was no set or consistent time for recovery, this made some repetitions easier than others, however on the whole 5 reps was a good start and next time I will allocate a set time of recovery.

**Week 2**

**Date: 19/06/18**

**SAQ Training**

**Warm up:**

Pulse Raiser: Gentle jogging, skipping, cherry picking, side steps, cross overs  
Dynamic stretches: lunging, squats, heel flicks, leg swings, calf walk

**Training:**

Exercise	Repetitions	WHR
12m Shuttle	6	144
Slalom	6	166
X-drill	6	180

Repeat for 1 set. Rest intervals 15 seconds between each repeat.

**Cool Down:**

WHR: 174

Gentle jog and static stretches for all different muscle groups

**Recovery HR (Minutes)**

1. 158
2. 124
3. 86
4. 58

**Borg Rating:** 12

**Evaluation:**

This week was once again extremely muggy and humid which made it harder work to train than it would've been in cool conditions, however this week I did mean a water bottle to help decrease the thickness of my blood. Once again I failed to stick to the set recovery time so this made activities completed at the end harder to do and can inhibit some of the progression on my agility, more than if I had a set rest time. My shoes were also the same but the ground was harder so this wasn't an issue this time around. I felt the number of repetitions increasing by one was a good thing as I felt the training was as difficult as the week before, this already shows a slight improvement in my agility, although it may be because the X-drill and 12m shuttle have become more practiced, so next week I won't include this. My borg rating was also lower which may also be a reason why, next week I'll try and get it higher.



**Week 3**

**Date: 26/06/18**

**SAQ Training**

**Warm up:**

Pulse Raiser: Gentle jogging, skipping, cherry picking, side steps, cross overs

Dynamic stretches: lunging, squats, heel flicks, leg swings, calf walk

**Training:**

Exercise	Repetitions	WHR
Slalom	7	154
L-Drill	7	160
23 yard shuffle	7	168

Repeat for 1 Sets

**Cool Down:**

WHR: 168

Gentle jog and static stretches for all different muscle groups

**Recovery HR (Minutes)**

1. 168
2. 120
3. 80
4. 60

**Borg Rating: 15**

**Evaluation:**

This week training was extremely hot meaning I lost a lot of fluid that had to constantly be replaced by rehydration. This meant it was harder to work at the intensity required and I had worked at in the last 2 weeks, this is why my borg rating was the highest this week. The ground was dry which meant my shoes weren't an issue. I struggled with the 23-yard shuffle as I wasn't used to this drill which made it harder to do and took longer. Also this week I was training on my own as opposed to the previous two weeks, this meant my extrinsic motivation and overall motivation was a bit less, this also contributed to a higher Borg rating. This week I had a set recovery time of 30 seconds as the heat and intensity would've put my wellbeing in too much danger. This is an improvement from the previous two weeks. This session has taught me perhaps I have to also plan my training around the extraneous variable (such as the weather), as this week it probably would've been best to work at a lower intensity of less repetitions. Next week I will definitely do the 23-yard shuffle as this needs improving.

**Week 4**

**Date: 03/07/18**

**SAQ Training**

**Warm up:**

Pulse Raiser: Gentle jogging, skipping, cherry picking, side steps, cross overs

Dynamic stretches: lunging, squats, heel flicks, leg swings, calf walk

**Training:**

Exercise	Repetitions	WHR
23 yard shuffle	7	156
X-Drill	7	168
12m shuttle	7	172

Repeat for 1 Set

**Cool Down:**

WHR:172

Gentle jog and static stretches for all different muscle groups

**Recovery HR (Minutes)**

1. 172
2. 100
3. 60

**Borg Rating: 15**

**Evaluation**

The weather today was very hot which made it hard to work as my heart was having to beat faster due to my blood viscosity. However, I kept the reps the same as last week to measure the improvements. I kept on rehydrating to try and make the exercise easier for myself to decrease the thickness of my blood. I found the 23-yard shuffle easier this week due to improvement through practice. I had set rests to stop me working too hard and my partner returned meaning that my extrinsic motivation was higher. Next week I will not do the 12m shuffle as this is becoming too easy through practice.

**Week 5**

**Date: 10/07/18**

**SAQ Training**

**Warm up:**

Pulse Raiser: Gentle jogging, skipping, cherry picking, side steps, cross overs

Dynamic stretches: lunging, squats, heel flicks, leg swings, calf walk

**Training:**

Exercise	Repetitions	WHR
L-Drill	4	144
X-drill	4	154
23 yard shuffle	4	164
Slalom	4	168

Repeat for 1 Set

**Cool Down:**

WHR: 168

Gentle jog and static stretches for all different muscle groups

**Recovery HR (Minutes)**

1. 168
2. 92
3. 60

**Borg Rating: 17**

**Evaluation**

Once again the weather was very hot, this caused me to adapt my training by having more drills but less repetitions of them so this allowed me to have more drinks breaks so dehydration isn't a factor that caused me not to work as hard as I should do, also my improvements I made after fitness testing after week 4 proved my training schedule is working so I didn't introduce any new drills. All of the conditions were the same as previous weeks so I am getting used to them, this allows me to push myself harder, hence a high BORG rating this week. Next week I will continue with the same drills, the only difference being the increase the repetitions to 5 for the sake of progressive overload.

**Week 6**

**Date: 17/07/18**

**SAQ Training**

**Warm up:**

Pulse Raiser: Gentle jogging, skipping, cherry picking, side steps, cross overs

Dynamic stretches: lunging, squats, heel flicks, leg swings, calf walk

**Training:**

Exercise	Repetitions	WHR
L-Drill	5	130
X-drill	5	148
23 yard shuffle	5	160
Slalom	5	174

Repeat for 1 Set

**Cool Down:**

WHR: 174

Gentle jog and static stretches for all different muscle groups

**Recovery HR (Minutes)**

1. 174
2. 120
3. 78
4. 58

**Borg Rating: 16**

**Evaluation**

Although my heart rate suggests different I don't feel as though I worked as hard as last week, despite the increased repetitions from the week before, this may be due to the fact that the weather wasn't as hot as the previous weeks so I didn't struggle as much, if the weather is warm again next week I will increase the repetitions one more time, however if not I may add another additional drill. Also next week I am going to replace the slalom with the 12m shuttle as I feel as though the 12m shuttle is vital as it helps the most with the 'Speed' part of SAQ training. Apart from the weather this week all of the conditions were the same.

**Week 7**

**Date: 24/07/18**

**SAQ Training**

**Warm up:**

Pulse Raiser: Gentle jogging, skipping, cherry picking, side steps, cross overs

Dynamic stretches: lunging, squats, heel flicks, leg swings, calf walk

**Training:**

Exercise	Repetitions	WHR
L-Drill	6	144
X-drill	6	160
23 yard shuffle	6	174
12m Shuttle	6	190

Repeat for 1 Sets

**Cool Down:**

WHR: 190

**Recovery HR (Minutes)**

1. 190
2. 124
3. 80
4. 60

**Borg Rating: 17**

**Evaluation**

The weather was a lot hotter this week so I did what I previously said that I would do, which was increase my training by another repetition to 6. I felt as though I worked extremely hard this week as my BORG and heart rate suggests, however this may be due to the fact that I forgot my water bottle so could not hydrate effectively, meaning my heart rate had to increase as my blood was thicker. The conditions once again were the same, except I wore a different pair of shoes, however this didn't make a difference this week, as next week is the last week I'm going to push myself harder than any of the previous weeks in order to maximise my adaptations before the final tests, I will do this by having 5 repetitions of 5 different drills, this will also allow me to hydrate, provided I remember my water bottle!

**Week 8**

**Date: 31/07/18**

**SAQ Training**

**Warm up:**

Pulse Raiser: Gentle jogging, skipping, cherry picking, side steps, cross overs

Dynamic stretches: lunging, squats, heel flicks, leg swings, calf walk

**Training:**

Exercise	Repetitions	WHR
L-Drill	5	144
X-drill	5	158
23 yard shuffle	5	172
12m Shuttle	5	186
Slalom	5	188

**Cool Down:**

WHR: 188

**Recovery HR (Minutes)**

1. 188
2. 116
3. 58

**Borg Rating: 18**

**Evaluation**

I remembered my water bottle on this the hottest day out of the 8 weeks of training, so what I had planned last week with lots of breaks actually worked really well as it allowed me to keep continuously hydrating. My heart rate and borg rating suggest that this was the week I worked the hardest and It was the week I worked hardest, as I said last week, this is because I wanted to maximise my adaptations to make me better at agility. The conditions under foot and everything were the same as the previous few weeks so this meant I could train my hardest as I knew what I was doing. I found the X-drill particularly that much easier this week, probably because I've done it for the last 4 weeks so it is now practiced, if I was continuing then I would probably remove it next week. I will probably continue with a similar training schedule after this to prevent reversibility occurring. Overall I am happy with my final training session.

### **Fitness Test Results**

<b><u>Test</u></b>	<b><u>Best Score</u></b>
505 Agility Test	2.80s
T Test	11.75s
32m shuttle	10.65s

<b><u>Test</u></b>	<b><u>Best Score</u></b>
505 Agility Test	2.60s
T-Test	11.40
32m shuttle	10.00

<b><u>Test</u></b>	<b><u>Best Score</u></b>
505 Agility Test	2.45
T-Test	11.18
32m shuttle	9.89

Percentage increase from start:

505 test- 7.7%

T-Test – 3%

32m shuttle- 6.5%

Percentage increase from start:

505 test- 14%

T-Test – 5%

32m shuttle- 7.7%

Percentage increase from 2<sup>nd</sup> test:

505 test- 6.3%

T-Test- 2%

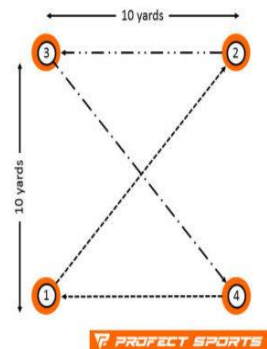
32m Shuttle- 1.2%

## Fitness tests protocol

### X Drill

'The X Drill is excellent for developing change of direction, quick feet, and running at different angles. This is a helpful drill for practicing quick transitions and developing faster reaction times. Set Up: 4 Cones, 5 yards apart in a square

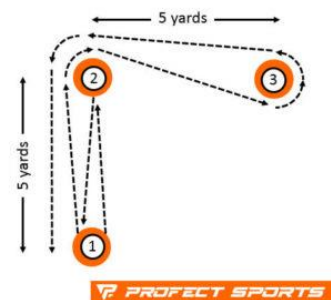
1. Start at Cone #1. Sprint to Cone #2.
2. Lateral shuffle across to Cone #3.
3. Pivot 45 degrees and cross over backwards to Cone #4.
4. Turn and sprint back to Cone #1.
5. Switch starting cone and repeat in opposite direction.'



### L Drill

The 3 cone L drill is another popular agility test used in the NFL combine to assess agility, balance, and change of direction. **Set Up:** 3 Cones, 5 yards apart in L shape

1. Start in a three point stance. Sprint to and touch Cone #2.
2. Sprint back to and touch Cone #1.
3. Sprint up and around Cone #2 toward the inside of Cone #3.
4. Turn around Cone #3, back around Cone #2 and passed Cone #1.
5. Switch starting cone and repeat in opposite direction.

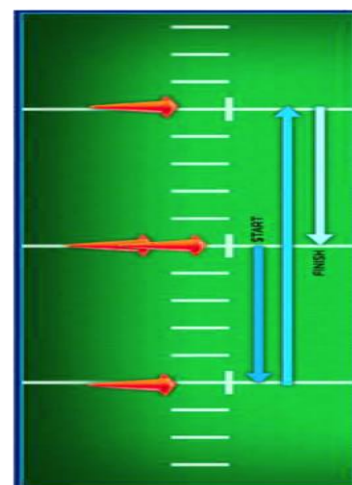


### 23 Yard Shuttle

Three marker cones are placed along a line five yards apart. The player straddles the middle line and puts one hand down in a three-point stance. The player can start by going either to the right or left direction. For example, on the signal 'Go' the player turns and runs five yards to the right side and touches the line with his right hand. He then runs 10 yards to his left and touches the other line with his left hand, then finally turns and finishes by running back through the start/finish line. The player is required to touch the line at each turn.

### 12 meter Shuttle

Place your toe to instep with your feet shoulder width apart or slightly wider.



**Arm Placement** – The arm of the direction you are running is relaxed, hanging from the shoulder, slightly bent. The first movement is to “throw” your arm to open up your shoulders.



**First Step** – The start motion is more like falling out of the stance as you run at an angle for the first 5 yards in order to transition into the first turn. You are going to start to turn as you stop. Do not be concerned whether your foot crosses the line. It is better to be balanced than to awkwardly reach to save a few inches. As much as possible, try to bring the back foot the lead foot. *The line is hot.* Do not mash the line. The body and hand go down together and up together. When leaving the first cone, look quickly at the far cone and accelerate.

**Again: it is a short sprint, but still a sprint.** As you arrive at the second turn, the same principles apply; start your turn as you stop and do not mash the line. When leaving for the finish, look for the far cone. If you look at the finish cone (the middle one), there will be a loss of sprint technique and a tendency to over lean and even stumble. Sprint past the finish. Most coaches will want to time you going both right and left, so practice this technique going both directions.

### Slalom

- Set up 5-6 markers or agility poles at various distances and directions
- Starting at the first marker or agility pole, run around each markers or agility pole in order to the final marker
- This is one rep

