

## **Goal scoring in small-sided games**

### **in ice hockey in comparison to 5v5 -game**

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<p>The purpose of this thesis is to show how small-sided games can be a really good way to practise goals scoring in ice hockey. The aim is to show how big the difference is between small-sided games and 5v5 game from the scoring chance point of view. You can't get more game like scoring situations than if you are actually playing the real game like drill.</p> <p>The thesis consists of a literature review, which discusses the characteristics of ice hockey and ice hockey statistics. It also goes into studies of small-sided games in other sports. The last part of the thesis is about how this research was planned and implemented.</p> <p>In this research based thesis I have first analysed three differed kinds of small-sided games with even strength and then compared the statistics from them to the statistics from five against five games played with even strength. Small-sided games were first compared as one unit and then separately to 5v5 game.</p> <p>There were six times more scoring chances and over seven times more goals in small-sided games. With in all small-sided games, 3v3 had the most goals and scoring chances.</p> <p>In small-sided games player with the puck had less time before shooting than the player in 5v5 game. There were also less passes before scoring chance.</p> <p>The results of this study were clearly indicating how much more happens around scoring chances when the area and the number of players are reduced. This would be an excellent starting point for the future research as gathering more material from other levels would be the next logical step.</p>	
<p><b>Keywords</b> Small-sided games, scoring changes, scoring</p>	

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# 1 Introduction

In most ball games your aim is to score as many points as possible and at the same time to stop the opponent from scoring. This definition fits also to ice hockey as the team, which scores more goals in a game will leave the ice with a victory.

Small-sided games are games in miniature size. They have all the elements from the sport, but because of the smaller area everything happens in a faster pace. For quite some time small-sided games have been a fundamental part of the practises among all team sports. Common factors in these drills are the reduced area in the playing field and reduced number of players.

The idea of this thesis came from author's former teacher Kari Savolainen. He wanted to gain more data to understand the factors that are in effect in small-sided games. Author himself wanted to focus more on ~~just~~ scoring chances and actual goal scoring during small-sided games.

In the thesis I will be analysing statistics from three different small-sided games (SSGs). These games were 2v2, 3v3, 4v4 and they were played cross-ice with two goals and goalies. Results from SSGs were compared to the results from normal 5v5 full-ice game. Small-sided games are compared both as one unit, but also individually to 5v5 game. The results will indicate which is the best small-sided game format to play in cross-ice area.

With this thesis I want to advocate the small-sided games and prove how good of a tool they can be when practising game-like scoring. While playing small-sided games you do not only get lot of game-like scoring chances but you also get lots of other elements of the game. Every player will have a feeling that they have an affect to the outcome of the game because the number of times they touch the puck will be higher.

## 2 Literature review

### 2.1 Ice hockey as a sport

Ice hockey is a fast team sport played on ice, usually inside a rink, which size is in Europe  $1830\text{m}^2$  (61x30 meters). The ice rink can be divided to three parts, the defending zone, the neutral zone and the attacking zone as shown in the picture below.

Both end zones in Europe are  $685,8\text{ m}^2$  (22,86x30 meter) (IIHF, rulebook, 2014, 19)

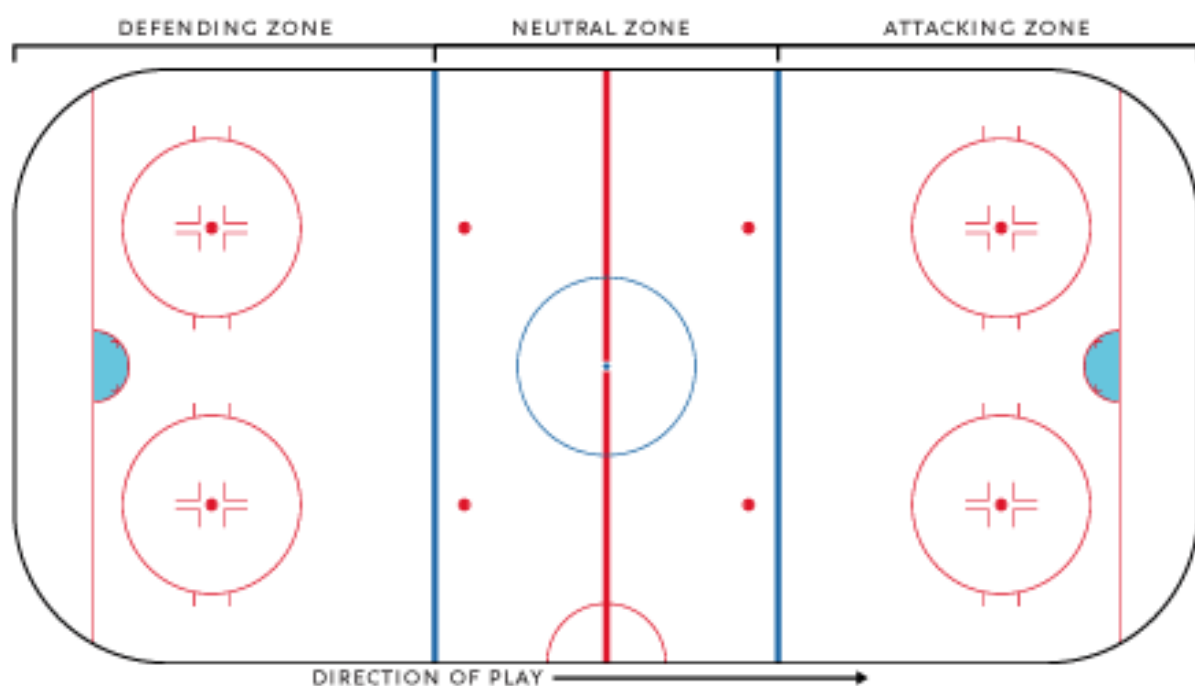


Figure 1. (Wikipedia, Ice hockey rink)

In ice hockey two teams are playing against each other with sticks and a puck. When playing with full strength both teams have five players and a goalie on ice. One game consists of three 20-minute periods. The time each player is active on ice vary in length - duration of one shift being in National Hockey League between 30-80 seconds and average shift being around 45 seconds. (MacLean, 2015, 1).

The most important skill for an ice hockey player is skating. Skating in full is a combination of forward, backwards and crossover skating. You also need to be able to make sudden stops, turns and accelerations. Within the shift, the player is not skating with

full speed the whole time - about 39% of the shift players are sliding with two legs. (Laaksonen, 2011.)

Fastest way to move the puck is passing. Thinking of the team's offensive game the passing the puck is the most important skill to focus at. Passing is cooperation between the passer and the receiver. Players need skills to be able to pass from different positions and with different styles. Receiver needs also skills to be able to receive passes while skating and while keeping ones head up. Short passes and passes given while skating finish often with the best outcome. (Mattila&Saarinen, 2000)

Even the best players do not keep the puck in their possession for more than a minute in a game. USA Hockey study from 2002 Olympic games showed that Joe Sakic, who was unbelievable in the Gold medal game, held the puck for only 1 minute and 19 seconds during the final game. (USA Hockey, 2002)

No matter what, puck handling is still a really important skill for ice hockey players. With good stick handling skills players will have more time to make decisions within a shift and more confidence to receive the puck in different situations. Players with good puck handling skills will have more confidence to keep their heads up and at the same time make better decisions. This is one of the main factors to develop in order to increase the game speed. (Tapola, 2008)

## **2.2 Scoring In Ice Hockey**

The team, which scores the most goals, leaves the ice as a winner. Scoring happen usually by shooting the puck. There are many shooting techniques to shoot the puck. Wrist shot is the most common way to score a goal. Almost 60% of goals are scored with wrist shot. You can also shoot with slap shot, backhand shot, tip in, deke or breakaway. Best way of to score is to shoot with a one timer which means shooting straight from the pass without reserving the puck. 52,7% of goals is scored this way. (Gerbe, 2013)

In junior games the amount of goals per game is much higher than in men's game. During season 2014-2015 the average number of goals scored per game was in NHL 5.324. (Quantohockey.com, 2015). In Finland's top league Liiga, the same numbers were 4.998 goals per game on average. (Liiga.fi, 2015) as in Finland's A-junior SM-liiga the statistics show 6.643 goals per game. (Finhockey.fi/tulospalvelu, Nuorten SM-liiga, 2015)

In Finland's B-junior Liiga an average number of goals scored per game was a bit higher, 7.792 goals. (Finhockey.fi/tulospalvelu, B-junioreiden SM-Sarja, 2014-2015)

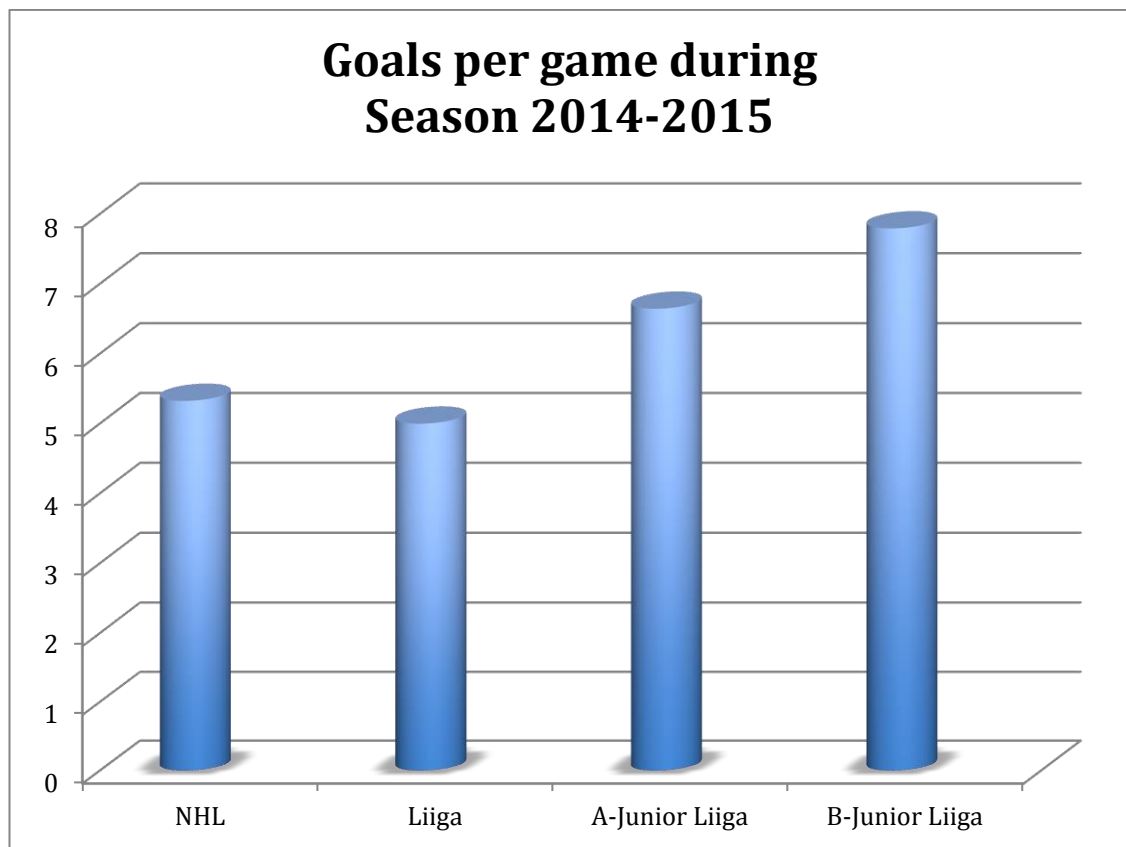


Figure 2. Goals per game during season 2014-2015

Former head coach of Finland men's National Ice Hockey Team Jukka Jalonen commented after 2015 U20 world championship games in Canada that scoring is the most important thing the players for Finland need to improve. He said that scoring is not only an individual skill and you need cooperation to create scoring chances and score goals. (STT,2015)

In Finland there has been only two real goal scorers in NHL, Jari Kurri and Teemu Selänne, both scoring almost 0,5 goals per game. (Finnish NHL-players career stats 2015)

Even though our knowledge of coaching and practising in full has improved a lot over the past years, still we can improve our practising sessions and each drill in order to advance the development of the scoring skills of every individual member of the team.

Actual scoring is usually practised without pressure or with soft pressure. I wanted to make thesis from this topic because I wanted to see if there is a big difference in scoring changes between small-sided games and normal five against five games. My interest was also to see what happens if we create lot of scoring changes in small-sided games with game-like full pressure. Should we play more small-sided games than make scoring drills where there is no full pressure like there is in a real situation?

Westerlund (2007) sees that shooting and scoring under pressure are the key elements when thinking how to develop goal-scoring skills.

With small-sided games we can have lot of scoring changes under the pressure and also include cooperation that Jalonen was talking about into the drill.

### **2.2.1 Scoring chance**

Scoring chance is defined as shot, which is taken from "scoring area". This scoring area is a circle, which reaches from the goal line to the blue line. From the image below you can see the three most dangerous scoring areas 1, 2 and 3.

92,8% of goals were made from these areas in 2006 Olympic games.

41,3% were made from the area number one, 33,5% from the area number two and 18% from the area number three. (Saarinen, Mensonen & Small, 2009)

Scoring chance can also be a shot taken from outside of this circle. Then the shot needs screening for the goalie, deflection of the puck or a shot that was taken after odd man rush. So scoring chance is not just any shot from anywhere on the ice.

(Walter & Johnston 2010, 53)



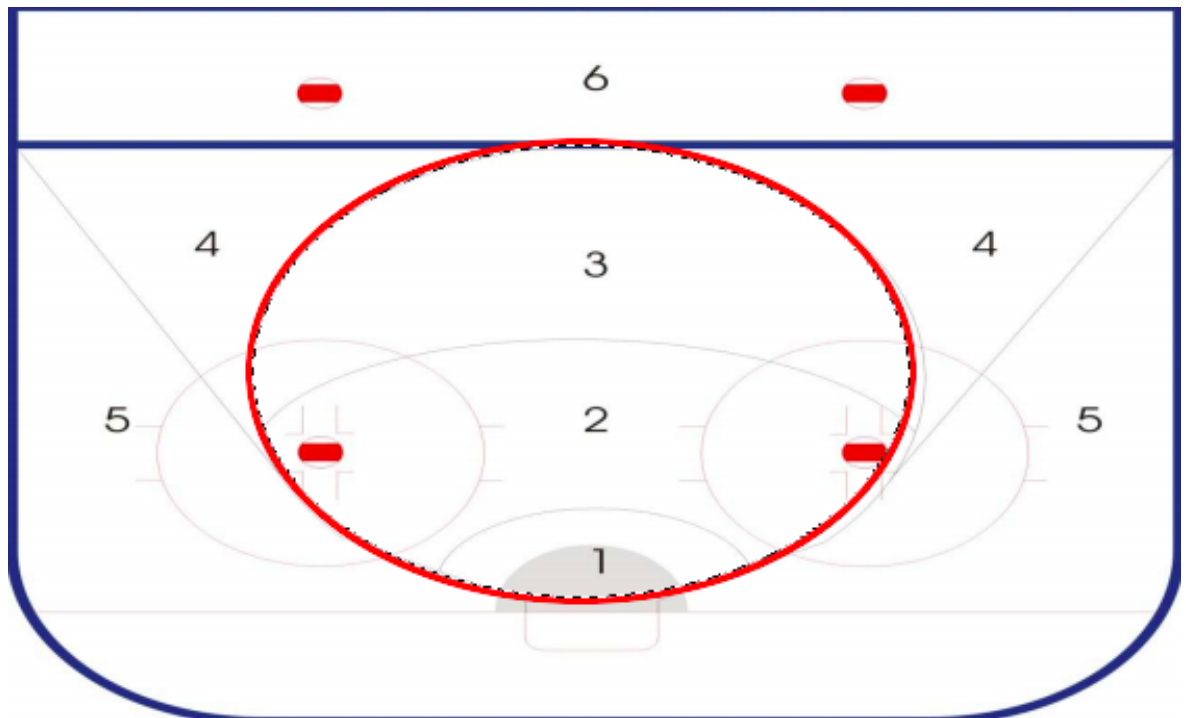


Figure 3. Scoring Area Figure (Saarinen, Mensonen & Small, 2009)

### 2.2.2 Scoring efficiency

Scoring efficiency is the number of goals the team scored divided by the number of Scoring Chances (IIHCE 2008, 7).

Scoring efficiencies have varied between studies. Mälkiä proved that there wasn't significant difference between 5v5 or 4v4 game formats on full ice, both formats had scoring efficiency just under 16%. (Mälkiä, 2006, 47)

### 2.2.3 Target of the shot

You can score with different kind of shots. But what is the best place to shoot the puck if you are aiming to score. The traditional way is to divide the goal into five parts. Upper corners are numbers one and three. Low corners are numbers two and four. If the puck goes between the legs it is marked as number five. In 2005 World Championships and the 2006 Olympics the goals were scored to following part of the goal from goalie perspective:

Number 1 (upper left) 22,5% of the goals

Number 2 (low left) 16,5 % of the goals

Number 3 (upper right) 15,4% of the goals

Number 4 (low right) 24,6% of the goals

Number 5 (between the legs) 17,3% of the goals

(Saarinen, Mensonen, Small, 2009, 24)

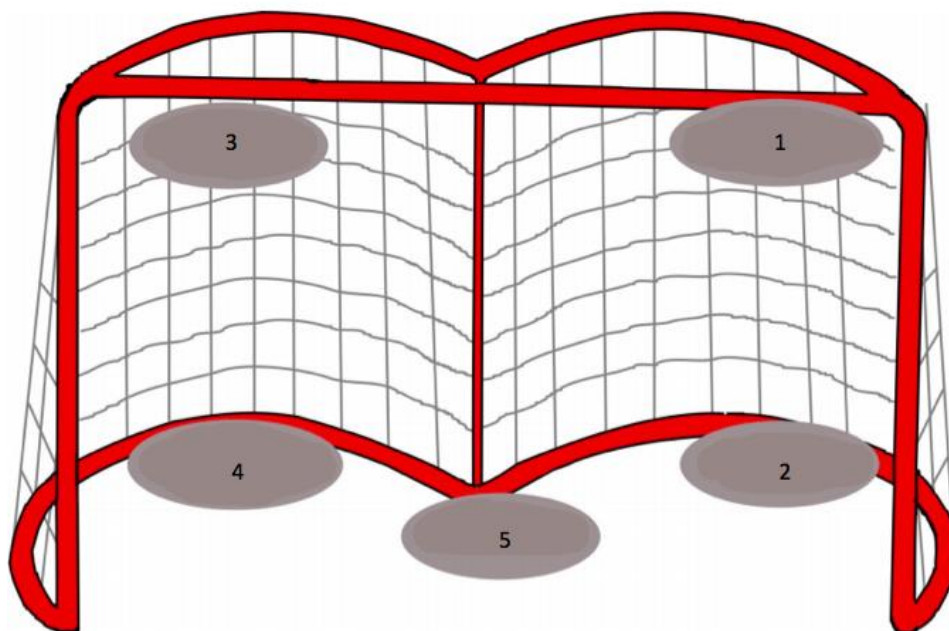


Figure 4. Scoring chart and placement of goals from the 2005 (Mensonen and Salo, 2008, 44)

The area you should target your shot to depend on where your location on the ice is. From the slot, which means area right ahead of goaltender between the faceoff circles on each side, the player should always shoot towards the upper corners and especially to just under the cross bars. This is because most of today's goalies are playing with butterfly-style and there is room in the upper corners. When the shot is coming from the slot the goalie does not have enough time to react and needs to rely on his ability to cover as much of the goals as possible. (Äijälä, 2007)

### 2.3 Small Sided games

Small-sided games, also known as SSGs, are popular in every ball game. They are like the game in miniature size and players will face same situations during SSGs as they do in real games. Rules variations, reduced playing area and reduced number of players are the things to notice in SSG. In SSGs coach encouragement can be very powerful tool

to use. He can for example encourage players to focus on a team play over a physical game. I think to every practise one should include playing and SSGs are great way to end the practise and have the players enjoy the game.

There have been a lot of studies made from different ball games, but not so many from ice hockey. One reason for this can be that hockey is not so big worldwide. USA Hockey made a study comparing cross-ice small-sided game and full ice game using kids under eight years of age. Cross -ice showed that there were six times more shots per player during small-sided games. There were also two times more touches to puck during small-sided games. (USA Hockey, 2015)

Changes in the cardiovascular system and physical fitness training have been studied a lot during past years. Especially in soccer SSGs effects to heart rate. And the results were connected to each other. Reducing the number of the players will increase the heart rate during the exercise.

Reason for this could be that decreasing the number of players forced all participants to be actively involved in the game, the SSG game demands more from the player. Result of increasing the field was also increasing player's heart rate. (Michailidis, 2013)

From technical elements point of view the results were also consistent. Study from basketball showed that the number of players has the most effect to the technical elements for example 2vs2 game had 60% more technical elements than on 4vs 4 game. (Klausemann, 2012).

Adding players to a small-sided game will increase the number of technical elements involved, but at the same time the total number of technical actions decreased per player. (Owen, 2004, 4).

At the same time as there were more passes, goals and shots during small-sided games, there were also more tackles and dribbling of the ball. (Katis & Kellis, 2009)

When kids were asked about enjoyment, small-sided games were also more or as enjoyable than games played on a full size court. (McCormick, 2012, 20).

## **2.4 Ice Hockey Statistics History**

At the same time with Ice hockey inside the rink developing rapidly, everything else around it is also developing. One of the hottest topics in hockey today, are statistics and learning how to use them to improve the game.

In the late 19<sup>th</sup> Century when the first ice hockey games were played, the newspapers kept records of goal scorers, but only from major games. People became aware of scorers and they became more famous. This led to a problem where everyone wanted to be number one goal scorer and held the puck to one self. One of the Americans top hockey leagues IHL, started to count “helpers” for goals in 1906-1907, but at first it was only one helper who got the mark for his pass. Over the years passing got more appreciated and passes for the goals were rising, there were times when as many as four assists for one goal were marked to the record. Since 1936 the maximum of two assisting passes have been rewarded together with the scorer.

One stat that wasn't there from the beginning was the player plus/minus stat. In that the players are awarded with a plus if they are on the ice when their team scored a goal or marked a minus when being on the ice when opponent scored. Montreal Canadiens first used it in the 1950s, but it came an official stat for the NHL in the season 1967-1968.

The stat has been criticised a lot of its' usefulness. It has been said that good players with bad line mates might have poor plus/minus stat because of the others. It can go also the other way a round. A weak player who does not participate as much to the game can have a good plus/minus record by just being be on the same line with good players. There was actually a five-year study where all goals that were scored for and against Edmonton Oilers were analysed. 70% of the pluses that were marked were given to the players who had some affect to the scoring, in the other hand 30% of the pluses marked were given to the players who had little or no affect to the goal. The

problem was even bigger in the minus stats the percentages being 50% for the players that deserved the minus mark and 50% for them who didn't have any affect to the goal. After this study it is easy to draw a conclusion that plus/minus stats deserve the bad reputation they have.

In the beginning of NHL only the games, goals, assists, points and penalty minutes were counted. Now you can find tens of different stats from web. Terms like Corsi and Fenwick have gotten to be lot more familiar for the ice hockey world.

Jim Corsi, the inventor of the Corsi number is a former goalie and a current goalie coach for the NHL. He invented a plus/minus stat where the things that are counted are the shots directed towards the goalie. Team Corsi number consists from the numbers of shots the team has shot towards the goalie reduced or divided by the number of shots the opponent has shot towards the goalie. Depending on the calculating method the result can be the difference of these or the percentage. Individual player's Corsi number is counted with same way but only from time when the player has been on ice. If looking at the results as percentages Corsi numbers range is from 40-60%, where 55% is an excellent result and 45% being below average. The Corsi number indicates clearly the time each team spends in offensive zone.

With the Corsi number there are the same problems to be found than with the normal plus/minus numbers. Again if good player plays with weaker line mates his Corsi number might be lower than it actually should.

Fenwick number is counted in a same way as a Corsi number but in Fenwick number the blocked shots are not included.

In the 1970s a former math teacher Roger Neilson came up with an idea to start counting scoring chances individually for each players. Current Hall of Fame Coach Neilson watched every scoring chance with his assistant coaches and rated players with +/- mark for every scoring situation. If a player took part to creating a scoring chance he was awarded a plus mark. The plus mark wasn't given to everyone on the ice, only the players who were involved got one. Minus marks were given according to the same idea.

(Edmonton Journal, 2013).

Mika Saarinen introduced a Player Profile tool at Vierumäki in 2007. A Finnish coach Risto Dufva was the main developer of the tool, but there is influence from other

coaches too. The tool has the same idea as the Neilson's stats. Players need to be productive, which means that players need to create more chances for their team than against it. With these stats players will have better feeling about their game. For example a player who does not score any point can be creating lot of scoring chances and at the same time play well defensively. With this tool statistics can be analysed from the team's or player's point of view. Using this tool will give coaches a better understanding of what has happened in the game. It is great feedback tool for the team and individual players. It's also great teaching tool for both the team and players. (Saarinen, 2007)

### **3 The aim of this study and the research questions**

In this research 5v5 games and different small-sided games were analysed from the goal scoring point of view. Research was done by analysing Pelicans B-juniors games and analysing small-sided games played by the same team. The purpose of this thesis was to compare results from these different games formats. I wanted to find answers to the following questions:

- Do small-sided games have more goals and scoring chances than five against five games?
- Do small-sided games have less passes and shorter puck time before getting a scoring chance?
- Is there a difference to be found between different small-sided game formats? And which format has the most scoring chances?

Hypothesis for this thesis were:

- Small-sided games have more goals and scoring chances than 5v5 game.
- Shooter has less time before a scoring chance in small-sided games than in 5v5 game.

## 4 Research methods

Collection of the data of small-sided games was organized during Pelicans B- junior's practises over the Christmas break in December 2014/ January 2015.

Small- sided games were played on different days.

Statistics from 5 v 5 game are from Finnish B-juniors National League games. Specific games were chosen according to even strength scoring chances in game statistics.

These games had the closest average to the one of the B-junior games. This average being 27,27 even strength scoring chances per game.

The games were:

Qualification game:

5.12.2014 at Vierumäki Pelicans- Jokerit, result 5-6, even strength scoring chances altogether 25

National League game:

22.2.2015 at Hämeenlinna HPK- Pelicans result 4-5 VL, even strength scoring chances altogether 23

Playoff game:

1.3.2015 at Lahti Pelicans- JYP result 2-0, even strength scoring chances altogether 24.

### 4.1 Data collection

Variables for this thesis were:

Goals, scoring chances, target of the shot, puck possession time before shooting in a scoring chance and passes with offensive team before scoring chance.

In addition, Pelicans B-junior's two better players were also calculated puck possession time and ice-time from games above. Joe Sakic and Mike Modano were the other two players who were in comparison in puck possession stats. Statistics for these Legends were from USA Hockey Puck Possession Project. (USA Hockey 2002)



#### 4.1.1 Small-sided games

Collection of the data of small-sided games was organized in Pelicans B- junior's practices. Games were played under the blue line cross- ice hockey style using two goals. There were three types of small-sided games played. The games were 2vs2, 3vs3 and 4vs4, in each game both teams had a goalie and rules were the same as in normal ice hockey game. There was also three periods in each game.

Average shift in 5v5 game is about 30-45 seconds, because in small-sided games there is less sliding with to skates I chose shift durations to be in 2vs2 20 seconds and in other two 25 seconds. There was 5 min break between the periods.

Playing time for two against two games were 9 minutes 20 seconds per period; total game time being  $3 \times 9,33 = 28$  minutes

Three against three games were played with eight players per team. One shift round was  $3 \times 25$  seconds = 75s. Altogether there were  $75 \times 7 \times 3 = 1575$  seconds, or 26 minutes 15 seconds.

Four against four games were played in two different days. On the first day there was 12 players per team and game time was  $3 \times 25$  seconds  $\times 7 = 525$  seconds. On the other day there were only eight players, so there was rest shift after every two active shifts. Game time was then  $50 \times 7 \times 2 = 700$  seconds. Game time in 4vs4 games totalled to  $525s + 700s = 1225$  seconds = 20min 25seconds.

#### 4.2 5v5 game

From 5v5 games data was collected only when played even strength five against five shifts. Data was collected from game videos by using PC programme called Steva Hockey. From the three games that were mentioned earlier, the even strength 5v5 game time was 134min 19 seconds game. This data was compared to the results of the small-sided games.

Individual puck possession stats were calculated from whole game, also including power play shifts because in USA Hockey's Puck Possession project included special team shifts also.

## 5 Results

### 5.1 Comparing the results

Because the game times weren't the same in small-sided games and five against five games, ratio numbers had to be created. This way the results are comparable. Ratio number is calculated by using the following equation: game time (from 5v5 games) divided by the game time (from different small -sided games).

For example, when comparing all small-sided games and 5v5 games the calculation was  $134\text{min } 19 \text{ seconds} / 74\text{min } 40\text{seconds} = 1,79888 \approx 1,799$ . The number is rounded to three decimals and all results from 5v5 game are divided with this ratio number.

### 5.2 All small-sided games versus 5v5

Here are the results for all the small-sided games and five versus five games.

The total game time from all three different small- sided games was 74 minutes and 20 seconds. In 5v5 the total game time from even strength shifts was 134 min 19 seconds.

In small-sided games there were 236 scoring chances altogether and 58 goals. In 5v5 game there were 72 scoring chances and 14 goals. When we convert these numbers to comparable shape we notice that there were six times more scoring chances and over seven times more goals made during small-sided games. So in small-sided games there were 18,9 seconds needed per one scoring chance, while the time in 5 v5 game was 111,9 seconds.

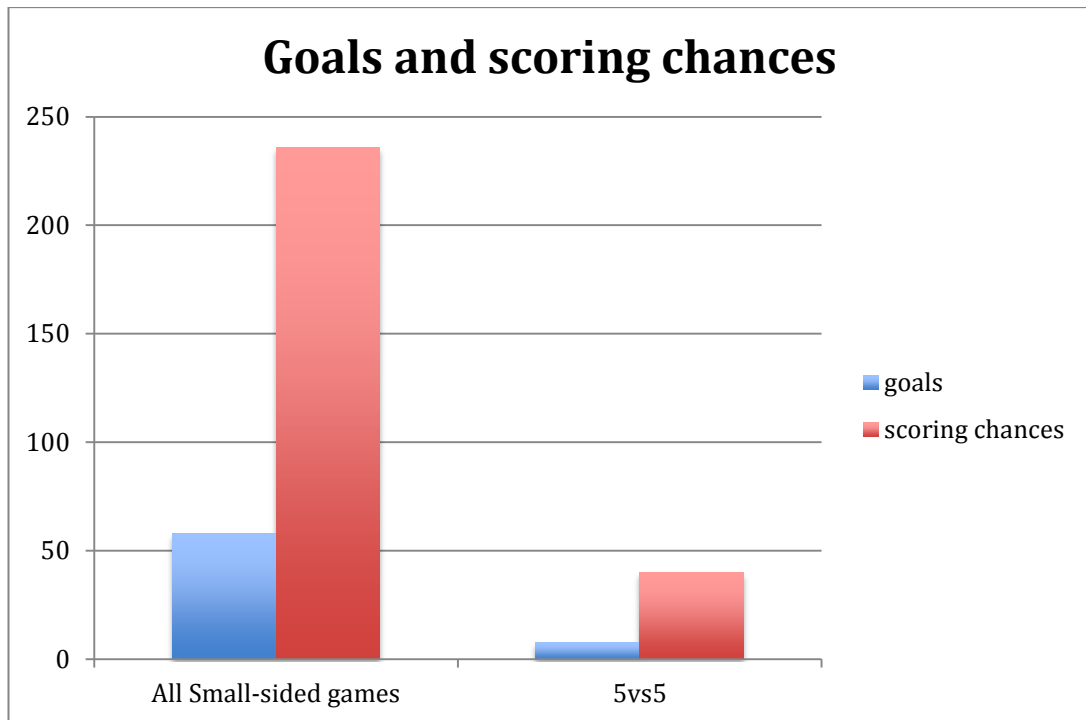


Figure 5. Goals and scoring chances all small-side games/5v5

The other variables were the shooters puck possession time before the shot in a scoring chance, number of the passes by the offensive team before the scoring chance and the target of the shot. Individual puck possession time was analysed only of two of the top players.

In small-sided games the shooter held the puck on average 1,766 seconds before the shot in a scoring chance, in 5v5 game the same time was 1,805 seconds. Because of the smaller area the situations come faster and the shooter does not have time to handle the puck.

As mentioned before, there were six times more scoring chances and over seven times more goals scored during the small-sided games than in 5v5 games. There were some differences found in the target of the shot when scoring. In small-sided games both upper corners let in more goals than in 5 versus 5 games. This could be explained by the fact that scoring chances appear so suddenly. In small-sided games and goalies have less time to react and they need to rely more just on covering the goal as much as possible.

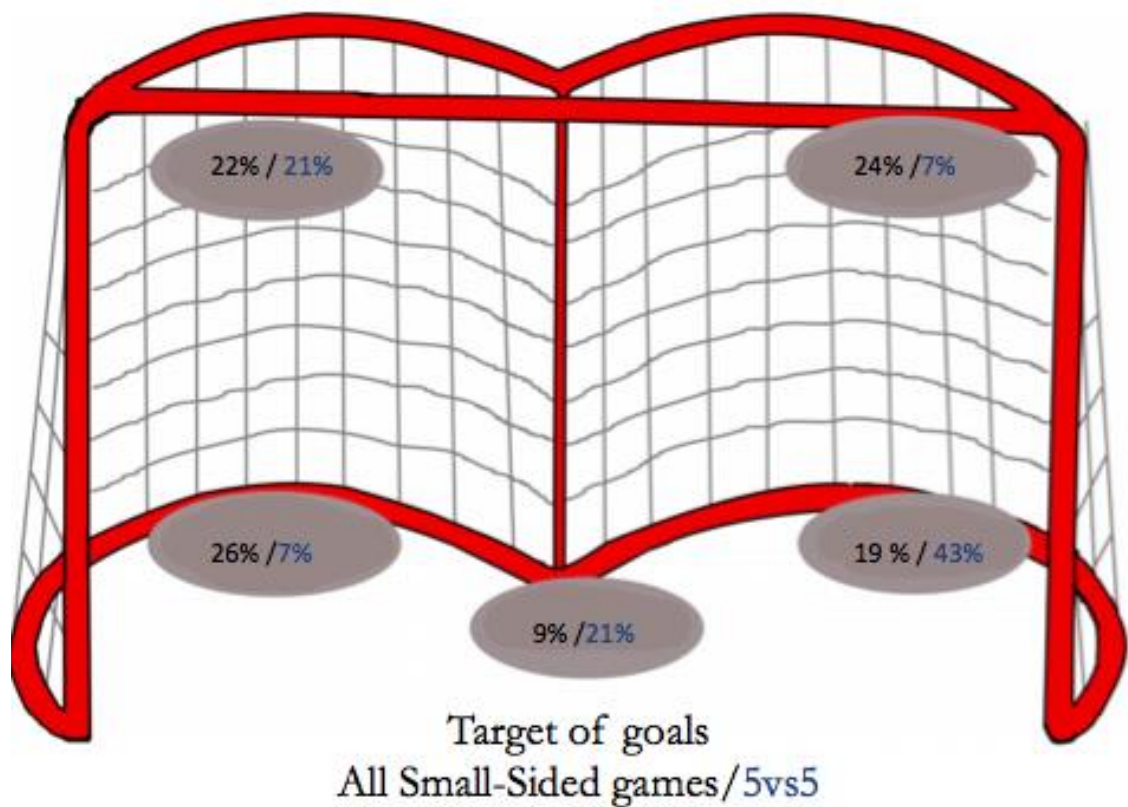


Figure 6. Target of the goals All Small-Sided games versus 5v5

When comparing puck possession time there was a huge difference between the game formats. The analysis was made of the team's two best players. Both analysed players had over 30 seconds more puck possession time in the small-sided games than in the game played 5v5. Player 2 had almost 100s more puck possession time during small-sided games. In the figure 8 results are converted to a comparable form.

Player	Ice Time	Puck Possession (seconds)
Joe Sakic (2002, Olympic Final)	15:25	1:19
Mike Modano (2002, Olympic Final)	19:47	0:58
Tony Amonte (2002, Olympic Final)	12:51	0:47
Player 1 (SSGs)	24:30	3:00
Player 2 (SSGs)	24:30	3:35
Player 1 (5v5)	15:13	1:18
Player 2 (5v5)	17:30	0:53

Figure 7. Original ice times and puck possessions before adjustments.

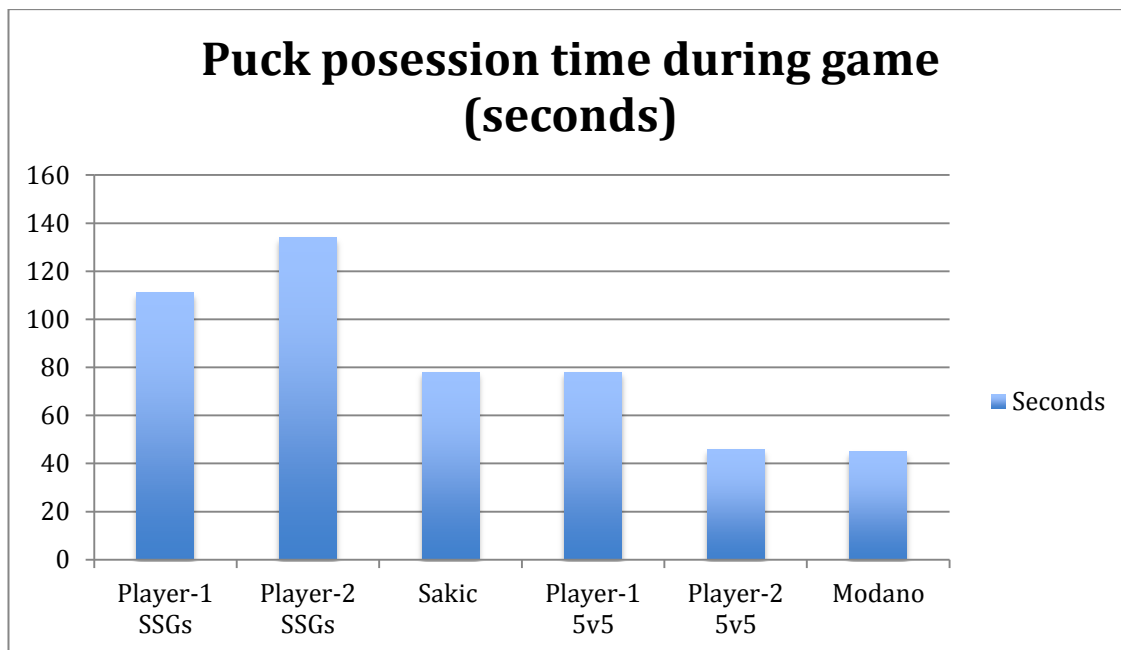


Figure 8. Individual puck possession time in one game in comparable form.

### 5.3 Small sided games separately

Variables	All small-sided games	2v2	3v3	4v4	5v5
Goals	15,9	1,46	20,2	12	2,1
Scoring chances	64,5	62,7	71,5	58	10,9
Player with puck before scoring chance (seconds)	1,76	2,2	1,66	1,28	1,81
Passes before scoring chance	0,73	0,56	0,8	0,86	1,53
Target of the shot:					
Upper right	24%	20%	27%	8,30%	7%
Lower right	19%	15%	15%	33,3%	43%
Upper left	22%	20%	19%	33,3%	21%
Lower left	26%	35%	27%	8,3%	7%
Five hole	9%	0%	12%	16,2%	21%

Figure 9. Results from all game formats in comparable form.

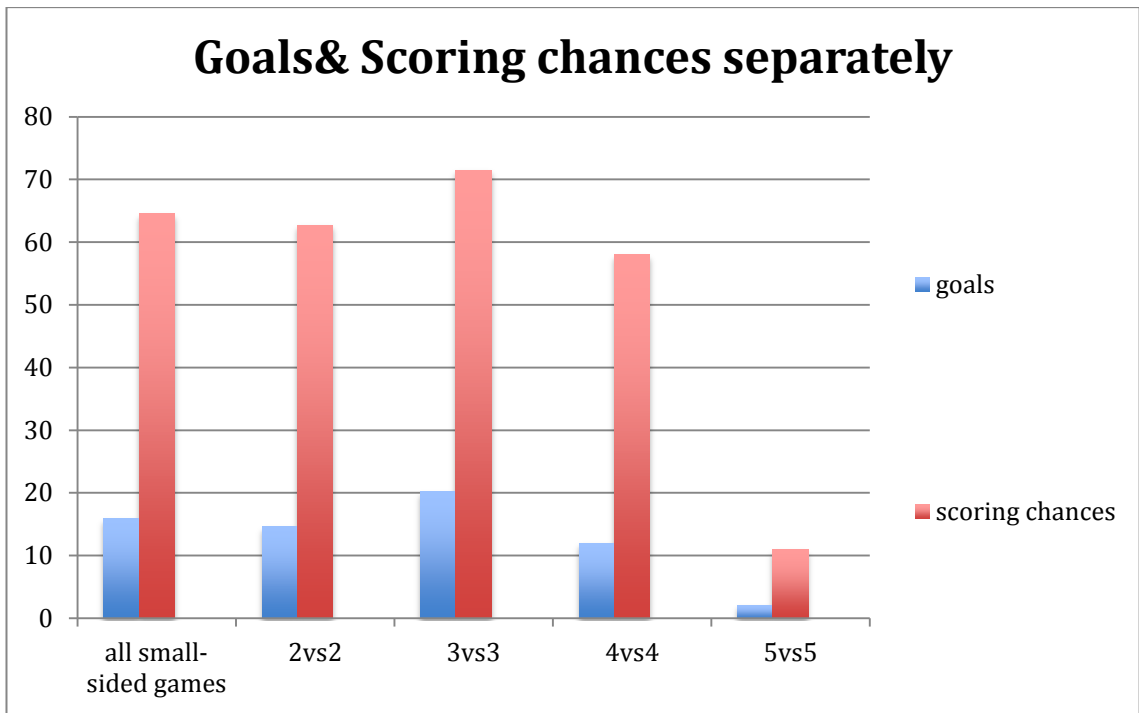


Figure 10. Goals and scoring chances separately.

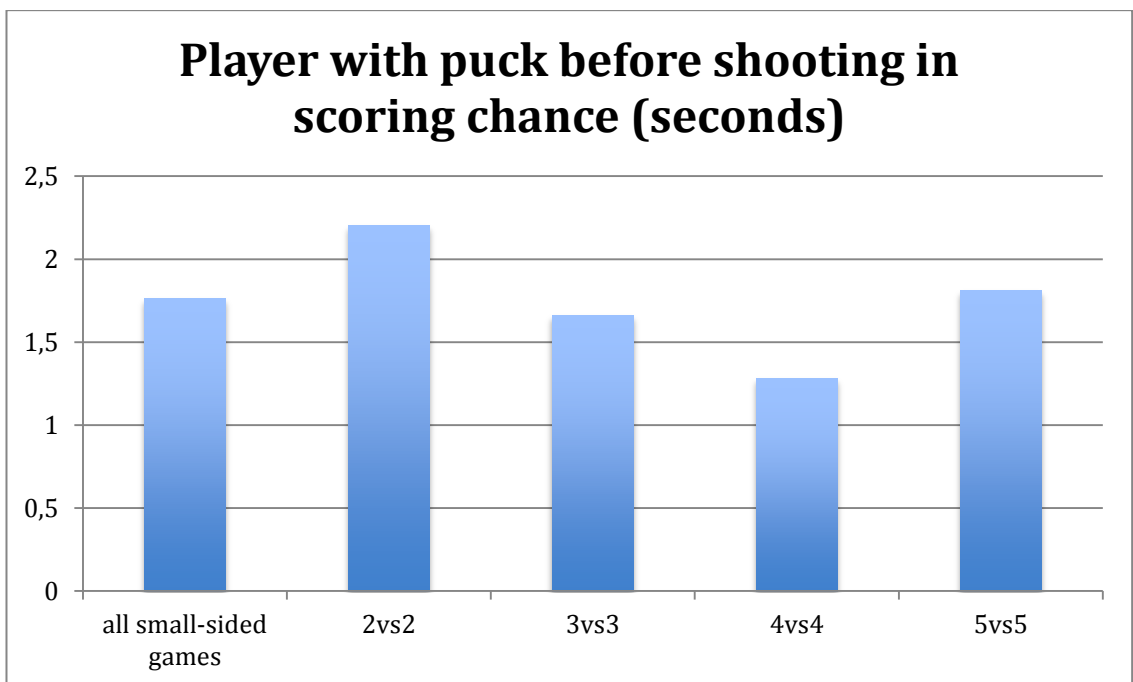


Figure 11. Player with the puck before shooting in scoring chance in seconds.

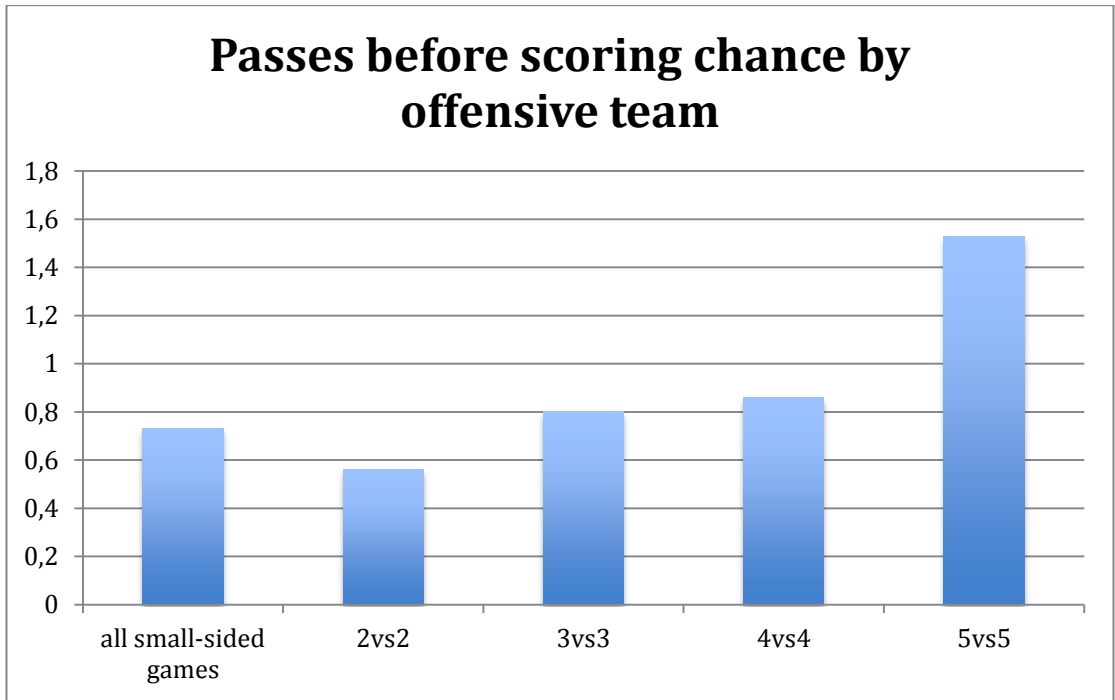


Figure 12. Passes before scoring chance by offensive team

## 6 Discussion

If one asks the players what do they want to do during the practise session today, they will most likely answer: “We want to play”. What if playing is great way to practise different things. There were six times more scoring chances and over seven times more goals scored during the small-sided games than during 5v5 games, the difference was surprisingly big. In the small-sided games there was one scoring chance in every 19 seconds as in 5v5 games the time needed was 112 seconds. All these results link to the reduced player number and decreasing the playing area. Players had to participate the game more and at the same time they were more involved in scoring situations. You can often see how the better team lowers its level of performance to the weaker team’s level. This happens because the game doesn’t demand them to give their best. In small-sided games the demands of the reduced area and number of the players create an atmosphere where players have to react quicker and make their decisions faster. When compared to all game formats, 3v3 had the most scoring chances and goals. There the shooter had also shoot quicker than in the 2v2 game. There is also a difference in number of passes in favour of the 3v3 compared to that of the 2v2 (0,8>0,56). As defined earlier scoring chance is a shot from the “dangerous “area, or the circle. Scoring chance can also be a shot outside of this circle, but then the shot needs “a supporting factor”, which can be a screen to the goalie or that the goalie really needs to make an effort to move to get in front of the puck. In small-sided games you have a shorter distance to this circle. Teams can create scoring chances by just one good pass. Transition game is affective when played in full ice, but it is certainly affective in small-sided games. The team, which steals the puck, will have a shorter distance to skate and following to that, to score.

When comparing small-sided game formats, 2v2 and 3v3 had the majority of scoring chances. If I had to choose one game format of small-sided games, I would choose three against three. As mentioned it leads to a bigger number of goals and scoring chances both of which were the most important variables for this thesis. What these results due to? In the 3v3 the player has always two line mates to play with. Puck carri-



er has more options than playing in 2v2 format. For example the player with the puck possession can create scoring chances more easily by shooting for a rebound, while two line mates are driving to the net. Also defending in 3v3 game is more difficult when there are more players involved than in 2v2. The defensive team needs to make more switches in man against man defence. Winning a defensive zone 1 on 1 battle will usually be awarded by an odd man rush, which will often result to a scoring chance. In a 4v4 game format you will have more options to pass but there are often at least two defenders inside the game, which makes scoring more difficult. There was also the least time for the shooter before a scoring chance, only 1,28 seconds. There was always one defender close to the puck carrier and the decisions were made maybe too fast compared to the normal full-ice game. 4v4 game format could be great in developing decision-making speed and at the same time communication between the teammates. The demands of the game made players help each other by communicating with each other on ice.

Even though I am saying the 4v4 is the poorest SSG- format from scoring chance point of view, it still had over five times more scoring chances and almost six times more goals than the 5v5 game.

There was only a small difference in the time the shooter had a puck before a scoring chance. In all small-sided games, shooter kept the puck for only 0,04 seconds longer before scoring chance than in the 5v5 games. When small-sided games were looked at separately the time was 2,2 seconds in the 2v2 small sided game, when in the 5v5 game time was 1,8 seconds. Again this can be explained the area and player number demands. In the 4v4 small-sided game this number was 1,28 seconds, which was clearly the shortest time.

Rational explanation for this is that the more you have space the more you will have time to make good decisions. When the game areas are compared between each other, the 5v5 game format on full ice has the most space, 183m<sup>2</sup> per player. Even though the 2v2 game had slightly less space, 171 m<sup>2</sup> per player, there was the longest puck possession time for the shooter before the scoring chance. Reason for this could be that in the 2v2 game there are fewer opponents who could “back up” their line mates when they make a mistake.

In the variable, target of the shot, there was not a big difference to be found between the small-sided games and the 5v5 game. The only noticeable difference was that slightly more goals were scored to upper corners in the small-sided games. This can be explained by the fact that scoring chances appear quicker in the small-sided games and there is not as much time for the goalies to react. When shooting from the slot, goalies rely to their coverage and now when they do not have time to skate to good coverage and there is often space left to upper corners. (Äijälä, 2007). Yet in both game formats more goals were scored to the lower parts of the goal, like most of the goal analyses have proved in earlier studies. (Saarinen, Mensonen & Small, 2008)

Reliability and validity of this research is good, because all the results are converted to a comparable format. Of course there could have been more games analysed in the research. Then the results would have been more reliable and valid.

In this research it has been proved that small-sided games create a lot of scoring chances and goals. But despite of those great things, SSGs include a lot of other technical and tactical elements of the game too. It has been studied that puck possession relates to the success (Rollins, 2010). In the small-sided games players will have a lot more “puck time” than in normal five against five game. Both analysed players had more than 30 seconds more puck possession time during SSGs than in 5v5 games. For example, in Olympic Gold Medal game in 2002, Joe Sakic’s puck possession time was 79 seconds. When changing stats to comparable form, Player 2 from Pelicans B juniors puck possession time was 134 seconds during small-sided games. With small-sided games player’s repetitions of game like situations will raise and they will become also better decision makers. Kids hate the feeling that they are not important or they are bored. They love participating and just doing stuff. With small area games they will get involved and they will have great feeling after the practise.

In spite of all the great benefits of the small-sided games, there need to be remembered that small-sided games are not the game itself. The real ice hockey is played on full-ice with blue and red lines, with offside and icings. The real game is not supposed to be played on that small area. Though there are a lot of scoring chances in small-sided games, there is also a need for a high quantity of shooting practises. When different

techniques are learned, small-sided games are a great way to put those techniques into practise.

The research results of this thesis should make us to think how we organize our practises. The Coach can have many small-sided games on the same ice and have more players involved. Especially younger kids should play more small-sided games to get to understand the game. Players will never complain that they touched the ball or puck too many times during the practise. Players love to play the game and they love to feel important and involved. Playing the game in smaller area will demand more from their decision-making skills and they learn to make better decision under pressure. Tempo of the game will be higher and there won't be any slow situations, lot of things happen in a short period of time.

SSGs are great for ice hockey but they can be really good for school's physical education classes. Teachers can easily divide groups by the skill level of the kids and everyone can play against the same level of children. The most important thing for school's physical education is to get kids excited about sports. And the kids will most likely get excited if they succeed during the lesson. When playing against the same level of children they will have more success in their performances.

## **6.1 Conclusion**

Small-sided games (SSGs) are a great way to get players involved to the game. Reduced game area and a smaller number of players will demand more from the players. There where more goals and scoring chances in SSGs than 5v5 game. When the number of players was increased, the number of the passes made by the offensive team before scoring situation was also incresased. Team's top players had siccnificantly more puck possession time in SGGs than 5v5 game. When analysed SSGs seperately 3v3 had the most goals and scoring chances when compared to all other game formats.

## 6.2 Future research

This research was one of the few made of the ice hockey's small-sided games. In the future making more similar studies will create more material and at the same time make the results more reliable. In the future more variables could be taken in to the study, for example make Corsi and Fenwick stats from SSGs. And then look if the team with good statistics succeed in winning games. This would mean taking more small-sided games into examination. One interesting direction for future research could also be to see how teams who use lot of small-sided games would improve their scoring efficiency, the number how effectively team uses it's scoring chances.

In this study it has been showed that small-sided games include a number elements similar to those in the 5v5 game. In the future it would also be interesting to see how small-sided games differ from full ice game from cardiovascular system point of view.

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