IDENTIFYING GEOGRAPHICAL AND COMPETITION-BASED INEFFICIENCIES IN THE NATIONAL HOCKEY LEAGUE ENTRY DRAFT

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Abstract

The National Hockey League (NHL) Entry Draft is a player acquisition exercise held yearly, with each team assigned one selection per round, for seven rounds. Previous literature has highlighted a range of potential geographical influences on athletic development. This research evaluated the effect of development in different geographic regions and competition levels on games played and career performance in the NHL. A descriptive analysis suggested playing professionally in Sweden or Major Junior in North America was associated with increased games played and career performance at the NHL level. However, only geographic region had a statistically significant effect on these outcomes. These results suggest several intriguing areas for future research as well as a range of practical implications.

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Table of Contents

List of Tables

List of Figures

Chapter 1: Background and Literature Review

Background

Success in professional sports requires consistent and effective talent identification and development[1]. The expectations of ownership, media and fans for their team to consistently contend and challenge for championships puts considerable pressure on those building a team to identify, acquire and develop athletes who can help the team win. There are various methods for acquiring those athletes, dependent upon the rules set out by the individual leagues. In the four major North American professional sports, Major League Baseball (MLB), the National Basketball Association (NBA), the National Football Association (NFL), and the National Hockey League (NHL), this is primarily done using an entry-draft system. Each league has different draft rules, but the premise remains the same; teams select athletes from a pool of approved players who are 18 years of age or older. In comparison, professional soccer uses a free-market system, where teams are allowed to sign young athletes to contracts and develop them through youth academies. Using this approach, athletes can be signed to professional contracts in childhood, giving a team the rights to players earlier and for a longer period.

While each system has pros and cons, for the purposes of this research, the focus will be on the drafting system employed in North America. Under this system, and with only slight variations, each team is assigned a draft selection in every round usually commiserate with their finishing position in the previous season. The NFL and MLB have strict systems whereby teams who finish last select first, with the process moving downward, ending with the team who won the championship. In comparison, the NHL and NBA use a lottery system, where all teams who

[1] The authour is employed in the National Hockey League and uses knowledge from their professional work environment to provide context and practical implications throughout this paper.

miss the playoffs in the previous season have their draft selection in the first round determined by lottery.

A lottery system is seen as a deterrent to purposely losing at the end of the season in order to be able to select higher in the entry draft. Once the lottery is completed, teams draft in reverse order of their finish in the previous season. The entry draft is seen as vitally important to maintaining parity in respective leagues by giving teams who struggled the previous season the chance to select athletes who are deemed to be more talented, promising, and impactful at the professional level. This is done to ensure any talent is spread around the league with the idea of creating cycles of contenders and rebuilders, and parity.

Focusing on the NHL, this league also employs a hard *salary cap*, which is another mechanism to ensure parity throughout the league. The salary cap dictates what each team is allowed to spend on its players, regardless of how wealthy the organization may be. In professional soccer, for example, teams such as Bayern Munich, Real Madrid, and Manchester City can buy players from other clubs and pay these players incredibly high salaries if it falls within the financial fair play rules. Thus, wealthy clubs in this sport can monopolize most of the world class talent (e.g., Bayern Munich has won nine straight league championships). The NHL’s salary cap prevents its wealthiest teams from outbidding other teams for the league’s best players.

NHL players under the age of 25 playing in their first NHL season must sign an entry-level contract, which can be worth a maximum of $925,000. Under salary cap constraints, it is imperative that teams get value from their entry-level contracts (i.e., players playing significantly above their contract worth). Moreover, the most successful teams have acquired their best players through the entry-draft process. Over the last decade, every team that won the Stanley

Cup had at least two players on their roster that were drafted with top-five draft selections. Furthermore, every team had drafted an average of 10 players on their championship roster, with a minimum of 7. Teams that have not produced talent through the entry draft, such as the Buffalo Sabres and Edmonton Oilers, have failed to win. As a result, it is important that teams develop an efficient and effective system for identifying players with greatest potential for success.

Unfortunately, research suggests the systems teams use for identifying, assessing, and drafting players have significant limitations. Johnston and Baker (2020), for instance, highlighted several problems in how athlete potential is evaluated, ranging from biases in how selectors evaluate players to unequal developmental opportunities for players throughout the skill acquisition process. Over the past decade, there has been considerable interest in how geographic factors relate to athlete success (Baker & Logan, 2007; Baker et al, 2014; Wattie et al, 2018); however, most of this work has focused on single countries. This thesis examines geographical inefficiencies in the NHL Entry Draft. More specifically, it explores whether certain countries and levels of competition are more likely to produce successful NHL draftees.

Literature Review

As noted above, multiple bodies of research have examined trends, biases, and strategies in the drafting of NHL players. This section provides a summary and analysis of the existing scholarly literature, with a focus on (1) entry discrimination/bias at the NHL Draft, (2) measuring and evaluating draft success, (3) the sunk cost fallacy in the NHL Draft, and (4) the influence of population density, proximity to Canadian junior teams' and other geographical factors on NHL draftee development. This review summarizes research examining how NHL teams have drafted historically, inefficiencies existing within the draft, and approaches to predicting expected output relative to draft selection. This research review forms the basis for further exploration of these areas in the current work.

Entry Bias in the NHL Draft

Lavoie (2003) proposed two possible sources of entry discrimination at the Entry Draft: scouts may be biased in their reports or general managers and coaches may be more likely to select local players when given the choice between two equally ranked players. Lavoie's regression analysis showed that in early drafts, English Canadians and Americans tended to have their offensive contributions overestimated by teams, while French Canadian and European players tended to be underestimated.

A more specific area of research in entry bias surrounds players native to Russia, more specifically those who play in the Kontinental Hockey League (KHL). Building on Lavoie's original research, Christie and Lavoie (2015) discussed the evolution of bias against Russian players. Their work used two regression models, a simplified one used in previous research and a more detailed model incorporating aspects of play that had not been tested in prior work. For instance, a defensive play metric was evaluated for the first time, revealing that Russian and French-Canadian players participated less in short-handed situations. The detailed model included draft number, nationality, defense, defensive play, height, weight, and penalties. The model found that bias against French Canadian players no longer existed, at least to a statistically significant threshold, suggesting they are now viewed in the same light as English Canadians and Americans. However, the system seemed to be inefficient or biased in how it considered drafting non-Russian Europeans and Russians. For example, Russians scored more points than their

English Canadian counterparts of the same draft rank by 16 points, while outscoring non-Russian Europeans by 8 points (Christie & Lavoie, 2015).

The reason for this effect may relate to administrative and contractual constraints between professional leagues. More specifically, the agreement between the NHL and KHL signed in 2010 bars a team in either league from signing a player currently under contract with a team in the other league (Christie & Lavoie, 2015). This makes drafting players under contract in the KHL riskier, as signing them can prove to be more difficult given those parameters. Christie and Lavoie (2015) noted that NHL general managers may be rational in their bias against drafting Russian players. However, the study did not encompass players who should have been drafted based on ranking but were not due to this 'KHL Effect'.

Measuring and Evaluating Success

Prior to evaluating the literature on draft strategy and success, some discussion of the importance of draft success is warranted. The importance of the NHL Entry Draft significantly increased in 2005 with the introduction of the salary cap. This cap was introduced for two main reasons, first to increase the profitability of the league by sharing revenues evenly between owners and players and second, to reduce the performance gap between the smaller and the larger market teams by limiting the amount every team can spend on their roster (Tingling et al, 2011). Drafted players are signed to entry-level contracts that are capped at amounts near the league minimum, thus allowing teams to pay younger players less than the market value of their contribution to the team. The better a team drafts, the more likely they are to maximize the value of entry-level contracts, allowing them to spend money on 'star players' without having to pay them 'star contracts.'

The challenge is defining what it means to produce a successful draft pick. The definitions of success within the NHL are evolving with the introduction of more advanced statistics; however, the most consistent measure of success used is the 200 games played benchmark (Schuckers, 2011). Games played has been used as the statistical measure of success in multiple studies related to entry bias, relative age effects and draft strategy. Games played is also used in the academic literature (Malloy, 2011; Schuckers, 2011) and is currently the only metric that is accepted by both academic researchers and NHL executives as a measure of draft pick success. Interestingly, this agreement does not exist for on-ice performance metrics, as executives believe academic metrics are not useful and current hockey metrics do not meet academic standards. Each NHL team has metrics they value and a consensus on models does not exist, although points per game among players who have reached the 200-game threshold has become widely used. The 200 games threshold means the player has accrued 2.5 seasons of gameplay and would complete their entry-level contract length (3 years) at the end of the third season. This threshold generally also reflects when teams consider a player to be fully developed and near the peak of their athletic abilities. Given that points per game can be plotted along a standard deviation curve, it is a component that could add another metric of draft success.

Tingling et al. (2011) explored three outcomes; on-ice performance, games played and financial compensation. Each of these options has strengths and weaknesses, leading to Tingling et al pointing out the merits of using games played as the key barometer of success. More specifically, games played is not impacted by coaching or management decisions the same way that financial compensation or on-ice performance are. On-ice performance could be positively or negatively impacted based on the opportunities afforded to each player, which are based on how their coach perceives their value to the team. However, a model encompassing all three may be the best solution. Using the games played measurement, 60% of drafted players from 1981-2003 did not play a single NHL game, and just over 20% played 160 games or more. Furthermore, players drafted in the first round had more success than players drafted in later rounds, with 64% of first round draftees playing more than 160 games (Tingling et al., 2011). In a related study, Koz et. al (2012) found players drafted in the first two rounds played more NHL games than their later-round counterparts. These studies supporting an ‘early rounds’ or ‘first round’ effect suggest scouts’ ability to identify talent decreases after the first two rounds and/or teams are willing to give players who are picked in the top two rounds more chances to succeed because of a greater perceived likelihood of success.

This early selection effect is maximized in players chosen first overall. Players drafted first overall have a 98% chance of playing 200 games or more and the chances decrease exponentially until it stabilizes towards the middle of the second round (Schuckers, 2011). In later rounds, the curve representing likelihood of a given selection playing 200 NHL games flattens and picks are valued as relatively the same, indicating players drafted beyond the fourth round have a near identical chance to play in the NHL, regardless of what round they are drafted in (Schuckers, 2011).

The Goals Versus Threshold (GVT), a metric showing goals created relative to replacement has become more prevalent in how NHL decision makers evaluate players. GVT is measured in goals and uses statistics that directly lead to goals. GVT allows for the measurement of “How good will this team be if Player A is replaced with Player B? (Vollman, 2016).” The GVT threshold shows a steady decline past the first round with stabilization occurring in the later rounds – like draft pick value. Building off GVT, Dom Luszczyszyn created Game Score and Game Score Value Added (GSVA). Game Score, adapted from basketball, is a linear weight model with the weights of each stat derived according to the frequency of goals occurring from them. To create GSVA, the Game Score is transformed into wins above replacement rate (Luszczyszyn, 2019). The purpose of GSVA mirrors that of GVT, in that it assigns value to each player based on the components that make up Game Score (goals, primary assists, secondary assists, shots, blocks, penalty differential, faceoff differential, even strength goals for and against, and even strength expected goals for and against). The value is compared against a replacement player (a player with a GSVA of 0), a positive value means the player is better than a replacement player while a negative value means the player is below replacement level. This is important for future research as GVT, Game Score or GSVA can be used to predict the value a player taken with any given selection will have in the NHL relative to a replacement player. Despite these other metrics, games played remains the most used measure of draft success, largely due to the absence of a standardized way to measure on-ice performance (Tingling et al., 2011).

Another outcome explored by Tingling et al. (2011) was financial compensation. The literature assumed that players were appropriately financially compensated based on value to team. However, financial compensation cannot be the only measure of player success as NHL decision makers and agents are responsible for negotiating contract worth. Moreover, different players will be worth different amounts in the eyes of different people. While it can be assumed that the best players make the most money, there are many examples of players who are below average making the same amount of money as the top-end talent. This speaks more to NHL general managers' ability to identify talent. A model that predicts the average financial value of a player drafted within any given selection could be used to measure draft success. If a player is producing above or below the expected financial value of their draft selection, the model can be used to determine the success of a draft selection.

To understand appropriate financial compensation, it is important to accurately evaluate offensive and defensive contributions by a player. This could allow for a dollar value to be attributed to each draft selection based on predicted contribution. Farah and Baker (2021) evaluated NHL draft selections between 2007 and 2014 using Kruskal-Wallis and Mann-Whitney tests. The study evaluated offensive and defensive contributions for forwards and defencemen, as well as lottery versus non-lottery picks. Results indicated that the round a player is drafted in had a significant effect on future offensive and defensive contributions, with the effect size shrinking with each subsequent round. As expected, based on the work discussed above, effect sizes were non-significant beyond the third round for forwards and second round for defencemen, again highlighting the lower accuracy of draft picks in later rounds. Interestingly, when comparing lottery picks (1-14) to non-lottery picks (15-30), significant differences with medium effect sizes existed among forwards drafted with lottery picks. However, the difference was only found for offensive contribution with no significant difference found in defensive contribution. This may be because forwards drafted with a lottery pick are more expected to make offensive contributions (i.e., score at high rates) and are not expected to contribute as much in situations that would require significant defensive contributions. Defenseman drafted with lottery picks showed no difference in offensive or defensive contribution compared to their non-lottery counterparts. This suggests considerable inefficiency in identifying and drafting top defencemen. Defencemen drafted in the first round outperformed those drafted later, but the order of selections suggested a clear inefficiency of talent identification. As it relates to this thesis, it is important to understand how previous literature and NHL decisions makers have defined a successful draft pick to apply the same logic.

The Sunk-Cost Fallacy

The sunk-cost effect as it applies to hockey is the phenomenon whereby teams are reluctant to give up on first round draftees because they have invested heavily in them by providing disproportionate development opportunities when it is clear that abandoning this course of action would be more prudent. Farah and Baker (2021) evaluated the sunk cost fallacy in the NHL Draft, following similar studies performed using the National Basketball Association (Staw & Hoang, 1995) and the National Football League (Keefer, 2017). Using a hierarchal multiple linear regression analysis, they found penalties, injury, and player relocation (trade) did not impact time on ice. Once these non-significant variables were removed from the analysis, offensive metrics had a significantly positive effect on playing time, but strong defensive metrics often resulted in less playing time. The study points out that this is likely because coaches do not penalize young players for poor defensive performance if they are contributing offensively. The results indicated that after controlling for penalties, injury and player relocation, the round a player was selected in had significant impact on their playing time. Players selected in the first round played an average of 60.68 minutes more over the course of a season. This is nearly five games more ice time, given the on-ice average of 11.28 minutes per game, for first round selections compared to their second-round counterparts. A clear sunk cost effect was observed, which aligns with anecdotal evidence that teams feel the need to give players drafted in the first round more chances to succeed due to the importance of first round picks in relation to winning championships.

Given the results of the study, it is likely the general findings can be applied to more recent drafts. While one might assume marginal improvement in draft accuracy year over year (e.g., as analytics evolve and scouts become more proficient), previous research suggests this is unlikely (Tingling et al, 2011).

Geographic Influences on Athlete Development/Success

The impact of geographic influence on NHL draft selection can also manifest outside of draft inefficiencies since these influences have the potential to influence athlete development and success more generally. Athletes from different regions can have unique environmental experiences that may lead to a disparity of elite athletes. Côté et al (2006) examined professional athletes across various sports to determine whether the size of an athlete's birthplace influenced their likelihood of playing professional sport. The study included 151 NHL athletes, making it particularly relevant to the current research, but was broader in scope with a total of 2240 professional male athletes. The study found that the likelihood of success was different in regions of different sizes. In hockey specifically, Canadian and US data showed that cities with more than 500,000 people and less than 1,000 people were underrepresented in the NHL. The study indicated the optimal size of a city to produce NHL players was between 1,000 and 500,000 people; and suggests geographic variables play a significant role in determining which athletes achieve the highest level of skill.

Looking more closely at the birthplace effect in hockey, Baker and Logan (2007) studied how birthplace and birthdate impacted development of North American NHL players drafted from 2000 to 2005. The study found that American players drafted from cities of 250,000 to 999,999 were 2.5 times more likely to be drafted by an NHL team, and athletes from cities of less than 2500 were significantly disadvantaged. The Canadian data indicated that athletes from a city with less than 10,000 were disadvantaged while athletes from cities with 100,000 to 250,000 were more likely to be drafted. The Canadian data mirrored the American data - athletes from cities between 500,000 to 999,999 were twice as likely to be drafted.

In a longitudinal tracking study, Baker et. al (2014) looked at the stability of the community size effect in Canada over 25 years as it pertained to the drafting of NHL players. The study grouped players in 5-year increments starting with the 1985 NHL Draft, and ending with the 2009 NHL Draft, for a total of 5 segments with a minimum sample size of 475 players. The study found that patterns of over and under representation remained relatively consistent over 25 years except for two population categories: 250,000-499,999 and >1,000,000. In particular, the data for the >1,000,000 category was less consistent than other categories over the 25 year period, but significant effects for the odds ratios were small. While there was volatility in those two categories, the collective results suggested some stability to community size effect from 1985-2009, with the effect being small. The study pointed at a potential reason for the volatility in the >1,000,000 category; only one city (Montreal) from 1976-1996 was included and, therefore, this category may not be as nationally representative as the other categories in the study. It is important to note that since the study's completion, both Toronto and Calgary have moved into the >1,000,000 category.

A follow-up study in 2018 by Wattie et al. examined the heterogeneity of community effect sizes in NHL draftees from Canada. The study's two objectives were (1) to explore whether the general population distribution for the effect differed within a single country and (2) test community size effects across the different Canadian provinces. Using a 15-year sample from 2000-2014, the athletes were predominantly drafted from the Canadian Hockey League. The study found that the largest proportion of draftees came from Ontario (37.3%), more than double the next closest region, Quebec (16.1%). Compared to the regular population, Quebec and the Atlantic provinces produced fewer athletes than expected. Athletes from small communities in Ontario and Quebec (<9,999) were less likely to be drafted into the NHL, whereas 30% of the athletes from Saskatchewan came from regions with less than 2,500. This indicated that community size effects are heterogenous in nature and in most cases, reflect the general population trends from the surrounding province. This is important as community size effects in Ontario are not the same as those in other provinces and the study supports previous research that community size is a proxy for other influences on athlete development (see also Farah et al., 2019).

Perhaps most importantly, all of these studies of birthplace effects used an athlete's birthplace as a proxy for their development environment concluding that not all development environments provide equal opportunities for athlete development. Moreover, Wattie et al. (2018) suggested other factors such as access to facilities and competition may have a greater impact on athlete development than community size. This can be seen in a more recent trend of NHL draftees moving from their birthplace in search of higher competition. It is particularly pronounced in Europe with players moving from Austria, Czechia, and Slovakia to Sweden and Finland where the level of competition is higher, and the development system is perceived to be better. The existing literature focuses on birthplace effect and developmental environment, but it does not evaluate how the developmental environment influences the selection of the athletes or their career performance.

Summary

Most of the academic literature has focused on three areas: entry-level discrimination based on nationality, measuring the success of a draft selection, and geographic influences on athlete development. Entry discrimination based on player nationality has evolved since the 1990s but remains prevalent. French Canadians, Europeans and Russians were selected lower than their English Canadian and American counterparts despite achieving higher performance standards in games played and points per game (Longley, 2000; Lavoie, 2003). More recent explorations of this nationality bias in the published research shows that French Canadians were no longer discriminated against. However, Europeans and Russians are disproportionately rated and selected lower than their counterparts (Christie & Lavoie, 2015).

There was a surprising lack of research surrounding the measurement and evaluation of success. In one of the rare studies on measuring draft success, Tingling et al (2011) used on-ice performance, games played and financial compensation as measures of success. Finally, while a relatively new area of scientific exploration, studies of geographic influences on athlete development have also evolved over time. In general, the literature supports the hypothesis that geographic influences play a role in athlete success. However, the literature has focused primarily on North American and Canadian effects, with recent studies becoming more focused on heterogeneity within communities of different size. If, as hypothesized, community size is a proxy for other influences on athlete development, factors such as differences in access to facilities, approaches to development, and/or levels of competition between geographic regions should be studied to understand the influence of these broad factors on development.

Chapter 2: Methods

The main objective of this thesis was to determine whether broad geographic factors related to where a player comes from affect their likelihood of success in the NHL. More specifically, this research examined the following question: Does development in different countries or competition levels affect games played and career performance in the NHL?

Participants in this research including 2,549 players drafted in the NHL Entry Draft over an 11-year period (2005-2016). The players were categorized by position, forward and defense, with goaltenders removed from the analyses. Of the 2,549 players, 1431 were forwards, 857 defencemen and 261 goaltenders. The data was collected and verified for accuracy using the private NHL data repository. The data is publicly available through multiple websites, but the accuracy of the public data is not verified by the NHL.

Players from 2005-2016 were used as it allowed for a sample size of more than 2,500 draftees and provided draftees with a minimum of 5 NHL seasons to accrue 200 NHL games played. Five seasons is used within the NHL as the amount of time to judge whether a player has to ability to positively contribute to their NHL team. Furthermore, it allows for 2 seasons of development prior to the reaching the NHL, and 3 seasons to accrue 200 games. Successful NHL players or rates of success are defined as draftees to have accrued 200 games played in the NHL.

Assessing Development in Different Geographic Regions

Research exploring the role of early development environments (Baker et. al., 2014) has struggled with ensuring the location reported by athletes in public databases (e.g., birthplaces or ‘hometown’) is a valid reflection of their actual early environment (e.g., players may move during their development between locations). In draftees for the National Hockey League, this a very complicated issue. For example, there is a freedom of movement that allows players to effectively choose their level and location of play. A North American born player can choose to play professionally in Europe, while a player in Europe or Russia can play Major Junior in North America. Players may also choose another region in their draft year if they believe it provides stronger competition and development. Complicating things further, the development system in Russia is unique as the NHL has specific rules stipulating that a player on a Russian-based contract is ineligible to sign a contract in the NHL. These rules may affect how NHL teams assess and view players from Russia.

In the current analysis, each player's competition level was defined as the level of competition in which the player participated during his draft year. They were classified according to three categories: Professional, Major Junior and Non-Major Junior. The classification of each league into one of three categories is congruent with practical application in the NHL. Professional indicated the player came from a professional league abroad, most notably in Russia or Sweden (n=41). Major Junior (n=383) reflected players from the elite level junior hockey leagues in each country such as the Canadian Hockey League, NCAA (USA), the J20 SuperElit (Sweden) or the MHL (Russia). Non-Major Junior (n=59) included leagues such as British Columbia Hockey league (BCHL), Ontario Junior Hockey League (OJHL) and North American Hockey League (NAHL) and US High School (USHS).

Analyses

Several analyses were conducted to consider differences between the groups. In step one, regions were assessed for whether they produced more or less talent than expected, as a preliminary assessment of where draft inefficiencies may be occurring. In this analysis, all players were included (i.e., even players who did not reach the 200-game threshold) to gain a better understanding of overall drafting success rate. Given the limited comparative work between countries in this field, descriptively analyzing the data was seen as having potential value for future research (e.g., with larger samples, different sports, etc.). These analyses allowed for examination of differences between leagues and geographic regions in the production of impactful NHL players.

Step two considered the percentage of players from each geographic region and competition level who played 200 NHL games. This standard is widely used by hockey executives and researchers as a reasonable indicator of success at the NHL level. Therefore, only players with 200 or more games played were included in this step (and step 2) of the analyses (n=516).

After limiting the sample to only players who were successful NHL draft picks (i.e., played at least 200 games), value to their team was quantified using points per game, a statistic that divides a player's career points against how many games they played in. The higher the number, the more impactful the player. Players were categorized based on their points per game along a normal distribution curve, using standard deviation. The top 5% of players in the dataset (i.e., those who were two standard deviations above the mean for points per game) were labelled 'franchise players'[2]. They reflected players with the potential to positively alter the direction of the franchise and are usually top-10 players at their position in the NHL for most of their career. Players who were one standard deviation above the mean were considered 'impact players', expected to contribute offensively, and have a positive impact on the outcome of games. Players within one standard deviation of the mean were labelled as 'average players' who produced

[2] Group labels come from common terms used in the NHL to reflect a player's contribution to their team.

slightly above and below average. Their performance had the most variance and was expected to be inconsistent over the course of their career. Players who were one standard deviation below the mean were ‘bottom players’, not expected to bring tangible positive or negative value. Players who were two standard deviations below the mean were labelled ‘fringe players’, and are typically used infrequently by teams (e.g., for injury replacements).

After the first two analyses were performed, step three of the analyses involved collapsing the player groups from five to three. Players who were above or below two standard deviations were grouped with players who were above or below one standard deviation. This was done because the sample of players in the top and bottom 5% of the dataset was too small to draw any statistically significant conclusions (i.e., analyses were ‘under powered’). The three groups of players were then labelled as ‘Above Average’, ‘Average’ and ‘Below Average’.

Kruskal-Wallis tests were performed in Microsoft Excel to determine if the country and competition level impacted the number of games played in the NHL. A Kruskal-Wallis test was chosen due to the uneven sample sizes of the groups in the dataset. Furthermore, a nonparametric test allows no assumptions to be made about the data (e.g., normality). This was seen to be a better fit than an ANOVA test which is sensitive to deviations from normality.

The forward and defense data sets were tested separately to determine any differences in positional drafting by region and by competition level. During these tests, any zeroes in the dataset (indicating no cases in this group) were removed for the ‘Professional’ levels in Canada and the United States. This was done because NHL rules dictate players drafted from those regions are ineligible to play professionally prior to the NHL Draft, thus making it impossible for a player drafted from either region to fall into this category.

Chapter 3: Results

Step 1

Forwards and defencemen were evaluated together to examine the likelihood of any drafted skater having a successful NHL career. Table 1 shows the number of skaters drafted, categorized by geographic region and competition level. The Region % column shows the percentage of draftees based on which country they played in during their draft year. Over 52% of skaters were drafted from Canada, nearly double the closest region. Canada, the United States and Sweden represented nearly 90% of players selected in the NHL Draft. Of the 516 players to play 200 GP, 88.9% of players are drafted from those 3 regions.

Table 1 – Number of skaters drafted by country and competition level.

Drafted	Pro	Major Junior	Non-Major Junior	Total	Region %
Canada	0	1084	122	1206	**52.71%**
USA	0	391	207	598	**26.14%**
Sweden	94	136	0	230	**10.05%**
Finland	35	50	0	85	**3.72%**
Russia	53	35	0	88	**3.85%**
Europe	55	14	12	81	**3.54%**

Table 2 – Number of drafted skaters to play 1 game by country and competition level.[3]

1 GP	Pro	Major Junior	Non-Major Junior	Total	Success %
Canada	0	587	48	635	**52.65%**
USA	0	232	59	291	**48.66%**
Sweden	60	50	0	110	**47.83%**
Finland	25	19	0	44	**51.76%**
Russia	26	14	0	40	**45.45%**
Europe	22	6	3	31	**38.27%**

[3] Included to show difference between how many players played in the NHL, but did not reach the 200-game threshold.

Table 3 – Number of drafted skaters to play 200 games by country and competition level.

200 GP	Pro	Major Junior	Non-Major Junior	Total	Success %
Canada	0	260	26	286	**23.71%**
USA	0	95	30	125	**20.90%**
Sweden	34	22	0	56	**24.35%**
Finland	16	3	0	19	**22.35%**
Russia	7	2	0	9	**10.23%**
Europe	17	1	3	21	**25.93%**

The success rate in the tables represents the percentage of players drafted from each region to play 200 games. Two hundred eighty-six players from Canada played more than 200 games, representing 55% of all players to meet the threshold and a success rate of 23.71%. Sweden represented 10.8% of players in the data set to reach the games played threshold, with the highest success rate of 24.35%. The United States, the region with the most NHL teams in proximity, produced the least amount of successful NHL players per selection, excluding Russia. While 45% of skaters drafted from Russia played at least one game, only 10.23% reached the 200-game threshold. The rest of Europe represented 3.54% of draftees in the data set but had a 25.93% success rate. This suggests leagues in Czech Republic, Germany and Switzerland may be under scouted given how few players were drafted from those countries compared to the rate of success. It also suggests leagues in the United States may be over scouted and players from those leagues may be slightly overvalued given their lower success rate compared to other regions.

Table 4 – All skaters drafted were included to demonstrate success of each competition level.

Drafted	Canada	USA	Sweden	Finland	Russia	Europe	Total	Competition %
Pro	0	0	94	35	53	55	237	10.36%
Major Junior	1084	391	136	50	35	14	1710	74.74%
Non-Major Junior	122	207	0	0	0	12	341	14.90%

1GP	Canada	USA	Sweden	Finland	Russia	Europe	Total	Success %
Pro	0	0	60	25	26	22	133	56.12%
Major Junior	587	232	50	19	14	6	908	53.10%
Non-Major Junior	48	59	0	0	0	3	110	32.26%

200GP	Canada	USA	Sweden	Finland	Russia	Europe	Total	Success %
Pro	0	0	34	16	7	17	74	31.22%
Major Junior	260	95	22	3	2	1	383	22.40%
Non-Major Junior	26	30	0	0	0	3	59	17.30%

The level of competition the skaters played in within their respective geographic regions was impactful. Skaters who played professionally (i.e., Sweden, Finland, Russia and Europe) had the highest success rate of reaching 200 games, even though they represented only 10.36% of the skaters in the dataset. Nearly ninety-one percent of successful NHL players drafted from Canada played Major Junior in their draft year. Of the 125 players to play 200 games, 24% played non-Major Junior in the draft year. In all cases except Canada, teams selected more Non-Major Junior players from the United States than Major Junior players playing in Sweden, Finland, Europe and Russia. Given that 23 of the NHL teams in the dataset are based in the United States, and the geographic proximity to non-Major Junior teams in the United States, it is possible these players were scouted more heavily than those playing Major Junior in other geographic regions. Of the Major Junior skaters drafted from Sweden, 16.17% played 200 games, whereas 14.49% of Non-Major Junior draftees from the United States played 200 games.

Table 5 – Skaters categorized by region, competition level and impact at NHL level.

	Forwards	Canada	Europe	Russia	Sweden	Finland	USA	Total
Above Average	Pro		1	2	5	4		**12**
	Major Junior	29	0	1	1	0	9	**40**
	Non-Major Junior	1	0	0	0	0	1	**2**
Average	Pro		9	4	17	9		**39**
	Major Junior	122	1	1	11	1	35	**171**
	Non-Major Junior	17	0	0	0	0	17	**34**
Below Average	Pro		1	0	4	0		**5**
	Major Junior	27	0	0	5	0	11	**43**
	Non-Major Junior	1	1	0	0	0	3	**5**

	Defence	Canada	Europe	Russia	Sweden	Finland	USA	Total
Above Average	Pro		3	0	3	1		**7**
	Major Junior	14	0	0	2	0	5	**21**
	Non-Major Junior	0	0	0	0	0	1	**1**
Average	Pro		3	1	5	2		**11**
	Major Junior	56	0	0	2	2	30	**90**
	Non-Major Junior	6	0	0	0	0	6	**12**
Below Average	Pro		0	0	0	0		**0**
	Major Junior	12	0	0	1	0	5	**18**
	Non-Major Junior	1	2	0	0	0	2	**5**

Grayscale used to highlight how the regions produce players relative to each other. White indicates poor performance relative to other regions and development levels. Dark indicates strong performance relative to other regions and development levels and medium gray indicates average performance. This was coded using conditional formatting in Microsoft Excel.

Skater impacts from different regions and competition levels were categorized by impact at NHL level (Table 5) using the normal distribution curve (Figure 1). As mentioned in the second analysis, the top two groups were collapsed into an Above Average category to perform the Kruskal-Wallis test. During the descriptive analysis, groups were separated to examine patterns that may not be statistically significant, but insightful for future research.

Fourteen of the 15 franchise forwards in the data set were playing at the highest competition level in their region in their draft year. Eight of the forwards were playing Major Junior in Canada, quadruple the next closest region. Of the 7 franchise defencemen in the dataset, 3 were drafted from Sweden (1 Pro, 2 Major Junior). Ten of the franchise players in the dataset were drafted from Major Junior in Canada, while 19 of the 22 franchise skaters were playing at the highest level of competition for their geographic region in the draft year.

Looking at impact players in the dataset, a similar pattern exists. Thirty-seven of the 39 impact forwards played at the highest competition level in their geographic region, with 21 impact forwards playing Major Junior in Canada. Twenty-one of the 22 impact defencemen in the dataset played at the highest level of competition for the geographic region in their draft year, with 12 playing Major Junior in Canada. When the top two tiers of players were combined, 76 of the 83 (91.57%) Above Average skaters in the data set played at the highest level of competition for their geographic region. More than 90% of impactful skaters played at the highest level of competition available to them in their draft year.

Skaters within 1 standard deviation of the mean were considered Average or middle of the lineup players. There was more variance within the level of competition a skater played at in his draft year, but the geographic region splits remained similar to the Above Average tier. Of the 244 middle forwards, 139 were drafted from Canada, with 122 Major Junior players representing the majority of the tier. Of the 113 middle defencemen, 62 were drafted from Canada, with 56 of those drafted from Major Junior. Given that 52.71% of skaters were drafted from Canada, it is unsurprising that 201 of the 357 skaters in this tier were drafted from Canada.

The results of this tier were in line with the rest of the regions as the United States produced 24.6% of the tier, Sweden produced 9.8%, 3.6% from Europe and 1.7% from Russia.

As noted in previous literature, Russian players are less likely to be drafted because of the KHL Effect. The data supported that assertion. Of the 28 defencemen drafted from Russia in the dataset, only one played 200 games, indicating a success rate of 3.5%. There were 60 drafted Russian forwards in the dataset, 8 of which played 200 games (a success rate of 13.3%). The most interesting observation was that 3 of the 8 (37.5%) Russian forwards were Above Average players with 1 being a franchise player. All Russian skaters who played 200 games were selected with top-75 selections in the NHL Draft. 25 Russian forwards were selected in the top-75 picks of the NHL Draft, with 8 of them (32%) playing 200 NHL games. By comparison, 235 of the 514 forwards (45.7%) drafted from other regions in the top-75 played 200 NHL games.

Step 2

A total of 351 forwards, 165 defencemen and 23 goalies (n=539) met the 200 games threshold, reflecting 21.14% of the original sample. At this stage, goaltenders were removed from the analyses since their performance is not measured by points per game. Each forward and defencemen's points per game were plotted along a normal distribution curve (Figure 1), accounting for position.

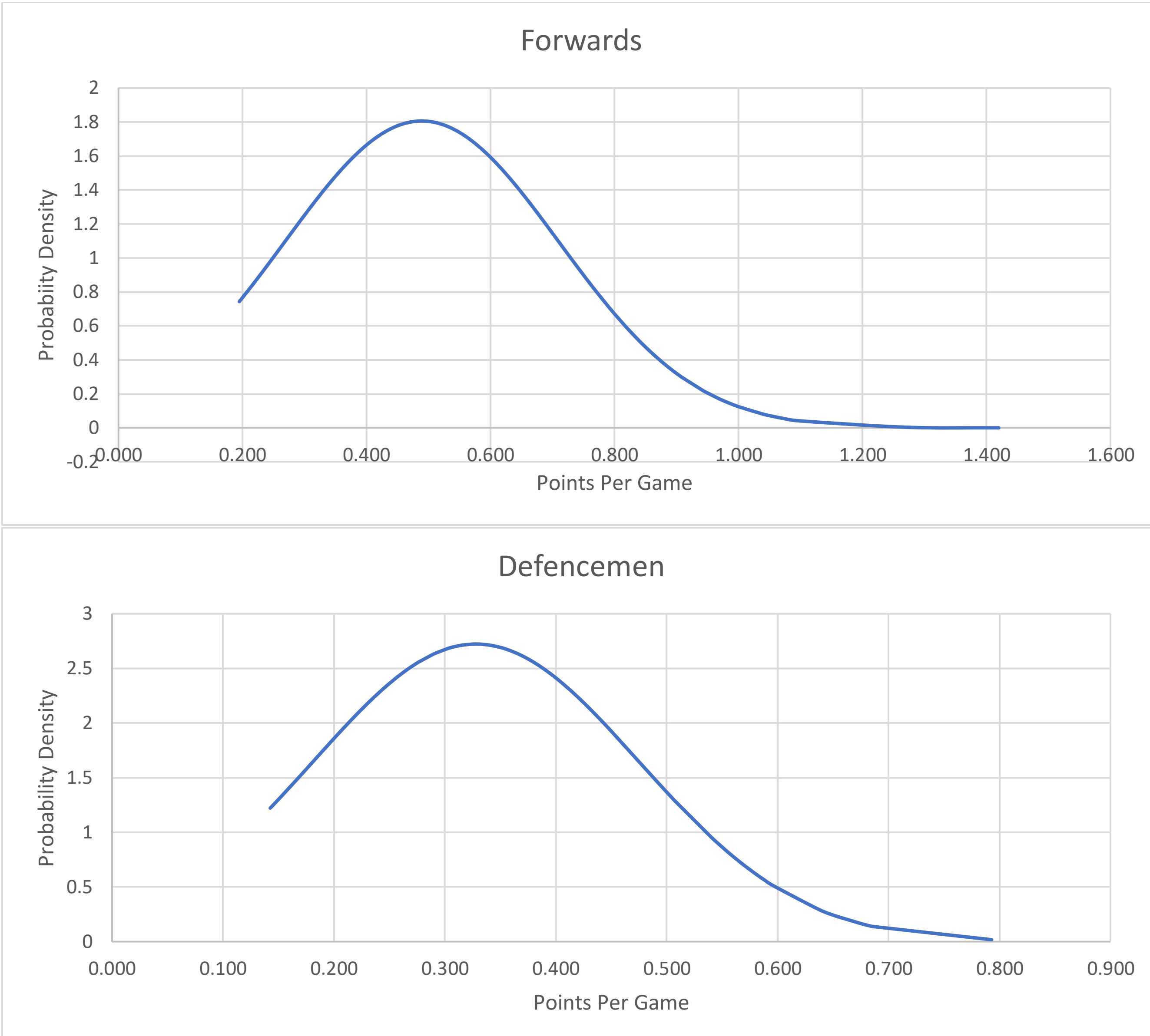

Figure 1 – Distribution of points per game along a normal distribution curve.

Based on the standard deviation approach described in the methods chapter, the following breakdown of player groups using a points per game (p/g) cut-off occurred: 15 franchise forwards (>0.910 p/g), 7 franchise defencemen (>0.630 p/g), 39 impact forwards (0.900 – 0.710 p/g), 22 impact defencemen (0.629 – 0.450 p/g), 244 middle forwards (0.709 – 0.270 p/g), 113 middle defencemen (0.449 – 0.185 p/g), 53 bottom forwards (<0.269 p/g) and 23 bottom defencemen (<0.184 p/g). As noted in the figures above, there were no players that measured below two standard deviations for points per game. A likely reason for this is that teams understand those players negatively impact team success and thus, they do not reach the 200 games played mark necessary to be included in this step of the analyses.

Step 3

Given the small sample of franchise players and no players in the 'fringe' group, standard deviation groups were collapsed and labelled Above Average, Average and Below Average. Players were also categorized by geographic region and competition level (Table 3). The geographic regions included Canada, United States, Russia, Sweden, Finland, and the rest of Europe. The competition levels were classified as Pro, Major Junior and Non-Major Junior.

Table 6 – Player categorization by geographic region and competition level.

Forwards	Above Average	Average	Below Average	Total
Canada	30	139	28	**197**
USA	10	52	14	**76**
Sweden	6	28	9	**43**
Finland	4	10	0	**14**
Russia	3	5	0	**8**
Europe	1	10	2	**13**

Defencemen	Above Average	Average	Below Average	Total
Canada	14	62	13	**89**
USA	6	36	7	**49**
Sweden	5	7	1	**13**
Finland	1	4	0	**5**
Russia	0	1	0	**1**
Europe	3	3	2	**8**

Table 7 – Results of the Kruskal-Wallis test of group differences by region

Kruskal-Wallis Test	Forwards	Defencemen
H-test statistic	17.222577	17.766227
df	5	5
p-value	0.002458	0.000895

The Kruskal-Wallis tests returned a statistically significant result for both positions, indicating differences between the expected versus observed values for geographic region from which a player was drafted. Based on data displayed in Table 3, Canada produced 56% of the forwards and 54% of defencemen to play 200 games. A trend of NHL teams having success drafting from North America exists, however Canada, the United States and Sweden successfully produced Above Average players at similar proportions. It was expected that Canada and the United States would produce the most successful players, but the observed success of Sweden (i.e., going against the expectation of inefficiency in the over drafting North American players) was unexpected as less players were selected from Sweden than North American regions.

Table 8 – Results of the Kruskal-Wallis test of group differences by level of competition

Kruskal-Wallis Test	Forwards	Defencemen
H-test statistic	2.6654	0.8971
df	2	2
p-value	0.2596	0.6295

The Kruskal-Wallis tests returned a statistically non-significant result for both positions, suggesting no differences between observed and expected values on levels of competition.

Chapter 4: Discussion

The main purpose of this thesis was to explore whether players' who played in different geographic regions and competition levels were differentially advantaged in the NHL draft. Second, the study examined differences among the regions and levels of competition within those regions in the production of impactful NHL players. Finally, a practical objective involved identifying potential areas of inefficiency in over- and under-scouting, and perceived valuation of players.

Collectively, our analyses showed that geographic region and competition level were related to NHL career performance, although competition level was not a statistically significant predictor of who ended up playing over 200 games. Generally, a player playing in North America was more likely to be drafted than a player from Europe or Russia. Furthermore, based on indicators of NHL career performance, players from lower competition levels who played in the United States appeared to have inflated value compared to those playing in non-North American regions.

Based on the descriptive analysis, teams were more likely to develop franchise and impact players if they drafted from Canada. The development of franchise and impact players from Sweden also trended positively in the dataset. Skaters who played professionally (i.e., Sweden, Finland, Russia and Europe) had the greatest likelihood of reaching 200 games but represented the lowest selection rate at 10.36%. This likely suggests teams are more likely to get a 200-game player from the Professional level than the Non-Major Junior level. However, it may also indicate teams are willing to take professional level players if they are very good, and less willing to take a chance on less impactful players at the professional level. It is important to note that non-North American regions allow players under the age of 18 to play professionally, whereas Canadian and American players are ineligible to play as a professional. It stands to reason that the best players from Europe would be playing professionally in their draft year, given that it is the highest level of competition available to them.

An area of inefficiency was detected pertaining to drafting players in Sweden. Sweden produced the same amount of franchise forwards and more franchise defencemen as the United States. When the groups were collapsed in step three, Sweden produced 11 Above Average players compared to the United States' 17. While the USA produced 50% more Above Average players, NHL teams drafted 260% more U.S.-based players than players based in Sweden. The proximity of geographic region to the NHL would seem to indicate that players in Sweden are undervalued when the amount of Above Average players produced per selection is considered.

A more specific inefficiency may exist when combining geographic region and competition level. Major Junior is viewed as a higher competition level than non-Major Junior; however, more players were drafted from the Non-Major Junior level in the United States than the Major Junior level in Sweden and other European nations. The proximity to the NHL may have partially inflated the value of players in the United States as scouts would likely have seen these players more often. The data showed that players drafted from Major Junior in Sweden had a slightly higher chance of reaching 200 games played (16.17%) than Non-Major Junior players from the United States (14.49%), despite players from U.S. Non-Major Junior being drafted 35% more often than Swedish Major Junior players.

Previous research indicates that the likelihood of athletic success is affected by where you are born. For instance, Côté et al. (2006) noted that athletes from mid-sized geographic areas (e.g., 50,000 to 500,000 inhabitants) were advantaged over peers developing in smaller rural or large urban areas. However, there has been little examination of the level of competition and contexts of players from different geographic areas. North America, for example, employs different development strategies than the rest of the world for minor hockey players. European nations allow underage players to play professionally, whereas North American systems do not. European nations use a development model that mirrors soccer; players are recruited to the academy of a professional team and developed under their watch, allowing them to rise through the levels at their own pace. North American players are bound by a draft to Major Junior hockey, where they must play for the team who selects them. Players can choose to forego Major Junior in Canada by choosing the NCAA path, which gives them more control over their location and development. While this research does not evaluate the merits of the individual development pathways, it is important to note the strong differences in approaches to player development across the hockey world.

The research did not conclusively show that players were over or under drafted from different regions or competition levels. However, it did inform a better understanding of the frequency that NHL teams draft players from different regions and how often those draftees played 200 games. Due to the lack of an accepted metric to measure on-ice impact, the study cannot conclusively determine where the best NHL players are drafted from. However, this research can be used to guide future studies on player impact once a consensus measure of on-ice impact is standardized. Importantly, this research does not mean NHL teams should and should not draft from different regions and levels. It may be more appropriately seen as a guide for what to expect from a draftee who plays at any given level in any given region. Using that information, teams can appropriately allocate their scouting coverage to what they believe will lead to more draftees playing 200 or more games in the NHL.

Limitations and Future Directions

Although the study is notable as an initial exploration of geographic differences between countries and levels of competition, the study contained a few limitations. For instance, using points per game to measure impact of players does not account for defensive play or overall impact on the game. Using Game Score or Game Score Value Added in future research would allow for more accurate measurement of player impacts and allow the sample to include goaltenders. Those metrics were not used for this research because they are in a development stage and an accepted standard has not been identified.[4]

Second, players were grouped based on where they played in their draft year. There have been instances where North American players go to Europe to play in their draft year and vice versa. Two prominent examples are Auston Matthews in 2016, who left the U.S. major junior system to play professionally in Switzerland, and Leon Draisaitl in 2014, who left Germany to play major junior in Canada. Matthews and Draisaitl were taken in the top-three selections of their respective drafts and were categorized as franchise players in the dataset. For the purposes of this study and identifying regions to scout in a particular year of development, Europe was given credit for Matthews when the majority of his development was in the United States, and Canada was credited for Draisaitl who largely developed in Germany. Although this reflects a general limitation in most of the work on geographic indicators and birthplace effects, future

[4] Both metrics rely on expected goals models as a major contributor to value. Expected goals models differ based on who constructed them. If the NHL were to publish an expected goals model along with the other statistics necessary to calculate Game Score or Game Score Value Added, it would allow researchers to have an accepted standard to use when evaluating players. Alternatively, researchers may be able to use Game Score Value Added in its current iteration and overlay it on previous years of data provided that a consistent expected goals model is used.

research could explore this further, generating a better understanding of how leagues across regions compare from a development standpoint.

Furthermore, future research should look at drafting efficiency rates within leagues in every geographic region. For example, in the United States, seven of 16 Above Average players were drafted from the NCAA. The U.S. National Team Development Program (NDTP) selects and centralizes the best US-born players to develop and play on one team in their Under 17 and Under 18 seasons. Of the 598 skaters drafted from the United States in the dataset, 119 came from the NTDP, with 32 of them playing 200 games. It is important to note that 4 of the 6 eligible NCAA players played for the NTDP prior to their NCAA season. Research evaluating the draft efficiency rate and player impact of drafting from the NTDP compared to the USHL could explore whether players have their value inflated by playing in the NTDP. Similar research could consider which Major Junior leagues in Canada (Ontario, Quebec, West) are most likely to produce players of a certain impact level.

A third limitation of the research was the KHL Effect. If a Russian player does not provide impact that would put him in the Above Average tier, they are likely to make less money in the NHL than they would if they played in the KHL. However, the data indicated a similar pattern for players drafted from Finland. Neither of those regions produced a Below Average player who played more than 200 games in the NHL. It is hard to know how many Average or Below Average players were produced from those regions as they rarely stay in the NHL. When the data is compared with previous literature, it appears teams are hesitant to draft players from those regions if they are not expected to be Above Average players because they are unlikely to played 200 NHL games.

The categorical nature of the games played variable also limited the types of analyses used. Draftees who played 199 games were excluded, while draftees who played 201 games were included. It is reasonable to say a player with 199 games played was a similarly successful draft selection as a player who played 201 games. Similarly, players who went undrafted in the dataset years but played 200 NHL games were not included. Future research should consider analyses that keep this variable in its continuous form to assess a linear analysis of career performance.

Due to NHL data privacy standards, the number of players in each year that were eligible to be drafted is unknown, as are the number of players who could have been drafted from each region or competition level. As a result, it is not possible to calculate an accurate denominator for an available population of eligible draftees. Determining these values would allow a more sophisticated and accurate assessment of base rates in each group/category.

Another approach to test the data would be to account for the differences in the draft years included in our analyses. Draftees from 2005 had more opportunity to accrue 200 games played than players drafted in 2016. The research could limit the ability to accrue 200 games for each draft year by allowing for five seasons of play post-selection. In doing so, players drafted in 2005 would have until the end of the 2009-2010 season to accrue 200 games played, while players drafted in 2014 would have to accrue 200 games before the end of the 2018-2019 season.

Finally, future research could consider developing a draft accuracy to team performance ratio. This would allow for a stronger conclusion to be made on the importance of drafting to winning games, and could allow NHL teams to be compared to each other, demonstrating which teams produced the most players to play 200 games and the relationship between this variable and games won over the course of a season.

Practical Implications

There are many practical implications of this research, both at a micro and macro level. Scouting is subjective in nature and using mathematical processes to identify potential inefficiencies can aid in removing any subjective biases that may exist. On a macro level, it can help organizations understand which regions and competition levels their amateur scouting staff should prioritize. Most NHL teams employ an amateur scouting staff of about 13. Usually, this would include three U.S.-based scouts, three Canada based scouts, three European scouts, one in Russia, two crossover scouts and one scouting director. The crossover scouts and scouting director cover all regions, while regional scouts focus on their respective regions. This allows the most senior members of the scouting staff to compare players from across the world with the benefit of concentrated work from regional scouts. Senior staff members will try to watch every draft-eligible player, worldwide, an average of eight times over the season, while regional scouts will see them a minimum of 15 times. It is the job of the regional scouts to identify their region's best players and inform the senior members of staff so they can be viewed appropriately. The goal of this process is to ensure that senior members are watching players most likely to play 200 NHL games.

Teams hold meetings throughout the season to rank players by region and overall. The first meeting takes place in January (mid-season) and is treated as preliminary. This research may be able to help guide scouts earlier in the season to allow senior management more time to watch players. The data gives an indication of which regions and competition levels are producing the best players and therefore, scouts can use that to guide which leagues within their regions are most important to watch. For example, the data from the current study indicates professional players from Sweden, Finland and Europe are most likely to play 200 games, while players in Non-Major Junior are much less likely to play 200 games. By using this, senior scouts may adjust their schedules to ensure they see more professional games in Europe.

The purpose of the final meeting is to finalize the master list using information from regional scouts, senior scouting staff, statistical analysis, personality analysis, off-ice physical testing and in-person interviews with draft eligible players. Each team has a different strategy to rank players; some believe centres and defencemen are more valuable and rank them higher, others believe in ranking by the best player available and recently, teams have started to rank by who they project will be the best at their NHL career peak. The research can be used to identify those players by guiding scouts to leagues and regions that have higher rates of efficiency.

The organizational draft mandate differs with each team and is macro in nature. The team's General Manager (GM) is responsible for the vision of the team and therefore, choosing which of the draft strategies outlined above is used. The GM must consider more than just the ranking of the players. They must consider where the current NHL team is in their competitive cycle (contending, middling, rebuilding), organizational needs at various positions, the depth of the current prospect system and ownership mandates. The research may be helpful for GMs to understand what regions and competition levels have the potential to draft more impactful players. If applied, a GM may ask his scouts to focus on areas of higher potential (Swedish professional leagues).

As mentioned above, a player with a contract in the KHL is barred from signing an NHL contract. If a player has a contract in Europe or North America (Junior), the player can play for an NHL team, but cannot play in the American Hockey League. If the player does not play in the NHL, they must be returned to the team who owns their non-NHL rights. Furthermore, the KHL Effect has caused hesitancy among teams to draft Russians as they are a threat to stay in Russia (i.e., to decline the offer to play in North America). The data supports this conclusion; Russia did not produce a single 'below average' player in the data set. This is likely because those players can play in the KHL for more money than they would make playing a lesser role in the NHL. Furthermore, the data indicated that unless a Russian forward is an impact player, they are unlikely to play 200 games. General managers may believe drafting a Russian is too big of a risk and issue a mandate against drafting them for that reason.

Alternatively, a General Manager may be partial to drafting European players ahead of Canadians because their rights are controlled for longer, giving the team more time to decide on the value of the player. For instance, an organization owns the rights to a player drafted from Canadian Major Junior for two seasons. If they remain unsigned, they may go elsewhere. An organization owns the rights to a player drafted from United States or Europe for four seasons. If they remain unsigned, they become a free agent and can sign with a team of their choice. This distinction between the control a team has in developing the player usually applies in the later rounds, where teams are drafting players that will require a longer period of development to reach the NHL. The current research suggests GMs may be well advised to draft professional European players in the later rounds, as they have a higher probability of playing 200 games than U.S.-based players, and the longest period to develop before team control expires.

The organization must consider developmental implications of draft selections as well. Teams can have much more say in the development process over draftees playing in Canada. They can meet with draftees regularly and conduct development sessions with them. The same cannot be said for the United States or Russia. For example, teams are barred from conducting development session with players in the NCAA or any Russia-based league. Teams can meet with players in those regions but are limited in the development work they can conduct. Teams who want to have hands-on development may decide against players from those regions because of the lack of access. As a result, teams have better access to their players in Europe and Canada, which allows them to work with them on a consistent basis and closely monitor progress. To summarize, teams may decide to select professional European-based players as they offer more team control, development control and a higher probability of 200 games played in the NHL.

Concluding Thoughts

Collectively these findings showed that both geographic region and competition level was related to future NHL career performance to varying degrees, although only region showed statistically significant effects. Practically, this research acts as a guide for scouts and organizations to understand where to focus resources going forward. For example, a potential inefficiency in drafting American players from the Non-Major Junior level over European professional players was identified and requires further investigation. This work provides a foundation for future research to continue more detailed exploration of drafting patterns to determine whether teams continue to draft in the same pattern, or if inefficiencies are improved upon.

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Appendices

Preliminary Analyses

Percentage of players drafted from each region and level to play 1 game and 200 games.

1 GP	Pro	Major Junior	Non-Major Junior	Total
Canada		44.4%	30.1%	43%
USA		42.7%	23.4%	37%
Sweden	54.3%	27.4%	0.0%	36%
Finland	54.3%	24.3%	0.0%	36%
Russia	37.6%	22.0%	0.0%	29%
Europe	44.4%	36.1%	19.0%	40%

200 GP	Pro	Major Junior	Non-Major Junior	Total
Canada		16.4%	14.0%	17%
USA		14.9%	11.2%	14%
Sweden	21.6%	9.3%	0.0%	14%
Finland	22.9%	2.6%	0.0%	11%
Russia	8.2%	2.8%	0.0%	6%
Europe	19.4%	8.3%	14.3%	17%

Prior to collapsing competition levels and player tiers.

Defence							
Franchise	Canada	Europe	Russia	Sweden	Finland	USA	**Total**
Pro		1		1			**2**
Major Junior	2			2		1	**5**
Tier 2 Junior							**0**
Other							**0**
Total	**2**	**1**	**0**	**3**	**0**	**1**	**7**
Impact	Canada	Europe	Russia	Sweden	Finland	USA	**Total**
Pro		2		2	1		**5**
Major Junior	12					4	**16**
Tier 2 Junior							**0**
Other						1	**1**
Total	**12**	**2**	**0**	**2**	**1**	**5**	**22**
Average	Canada	Europe	Russia	Sweden	Finland	USA	**Total**
Pro		3	1	5	2		**11**
Major Junior	56			2	2	30	**90**
Tier 2 Junior	6						**6**
Other						6	**6**
Total	**62**	**3**	**1**	**7**	**4**	**36**	**113**
Replacement	Canada	Europe	Russia	Sweden	Finland	USA	**Total**
Pro							**0**
Major Junior	12			1		5	**18**
Tier 2 Junior	1	2					**3**
Other						2	**2**
Total	**13**	**2**	**0**	**1**	**0**	**7**	**23**

Prior to collapsing competition levels and player tiers.

Forwards							
Franchise	Canada	Europe	Russia	Sweden	Finland	USA	**Total**
Pro		1		2	1		**4**
Major Junior	8		1			2	**11**
Tier 2 Junior							**0**
Other							**0**
Total	**8**	**1**	**1**	**2**	**1**	**2**	**15**
Impact	Canada	Europe	Russia	Sweden	Finland	USA	**Total**
Pro			2	3	3		**8**
Major Junior	21			1		7	**29**
Tier 2 Junior	1						**1**
Other						1	**1**
Total	**22**	**0**	**2**	**4**	**3**	**8**	**39**
Average	Canada	Europe	Russia	Sweden	Finland	USA	**Total**
Pro		9	4	17	9		**39**
Major Junior	122	1	1	11	1	35	**171**
Tier 2 Junior	14					1	**15**
Other	3					16	**19**
Total	**139**	**10**	**5**	**28**	**10**	**52**	**244**
Replacement	Canada	Europe	Russia	Sweden	Finland	USA	**Total**
Pro		1		4			**5**
Major Junior	27			5		11	**43**
Tier 2 Junior	1	1				1	**3**
Other						2	**2**
Total	**28**	**2**	**0**	**9**	**0**	**14**	**53**

Forwards and defencemen combined to see general totals.

	Combined	Canada	Europe	Russia	Sweden	USA	**Total**
Above Average	Pro	0	9	2	8	0	**19**
	Major Junior	43	0	1	3	14	**61**
	Non-Major Junior	1	0	0	0	2	**3**
Average	Pro	0	23	5	22	0	**50**
	Major Junior	178	4	1	13	65	**261**
	Non-Major Junior	23	0	0	0	23	**46**
Below Average	Pro	0	1	0	4	0	**5**
	Major Junior	39	0	0	6	16	**61**
	Non-Major Junior	2	3	0	0	5	**10**
	Total	**286**	**40**	**9**	**56**	**125**	**516**