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Man Games Lost in the NHL: A Correlation between Travel, Rest Periods and Injuries in the National Hockey League

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Abstract

Each year in the National Hockey League, teams travel thousands of miles, coast to coast, to play hockey. Each year there are also hundreds of injuries, and thousands of man games lost in the league. While there has been substantial research on how travel can affect Circadian Rhythms, no research has connected this with injury in the NHL. This study used Circadian Rhythm Theory, the amount of travel miles, and back-to-back games played by teams to understand a possible correlation between travel, rest periods, and the amount of man games. After analysis, it was clear there was no consistent correlation between the variables. Future studies may want to look into how the amount of ice time per game affects players, and how the number of games per year affects quality of play overall.

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Abstract

Each year in the National Hockey League, teams travel thousands of miles, coast to coast, to play hockey. Each year there are also hundreds of injuries, and thousands of man games lost in the league. While there has been substantial research on how travel can affect Circadian Rhythms, no research has connected this with injury in the NHL. This study used Circadian Rhythm Theory, the amount of travel miles, and back-to-back games played by teams to understand a possible correlation between travel, rest periods, and the amount of man games. After analysis, it was clear there was no consistent correlation between the variables. Future studies may want to look into how the amount of ice time per game affects players, and how the number of games per year affects quality of play overall.

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"High sticking, tripping, slashing, spearing, charging, hooking, fighting, unsportsmanlike conduct, interference, roughing... everything else is just figure skating." - Author Unknown (Quote Garden, 2010)

As injuries continue to mount in the highly competitive, physical National Hockey League, owners of National Hockey League Clubs are looking to protect their investments. Injuries are a growing concern among owners, fans, and the league itself. Because of how popular the game is, the investment owners make in their players, and for the safety of the players, there was quite a bit of potential significance related to this study. While every team is forced to travel coast to coast at some point during the season, understanding a relationship between travel and injuries would force the league into consolidating the travel into longer road trips and affect scheduling in a significant way.

Jet lag is a popular topic in sports. There is research that suggests that transmeridian travel affects athletes in game situations, putting the athletes who traveled to the game at a disadvantage. This has spurred quite a bit of research on Circadian Rhythms, fatigue, and muscle recovery in sport. While there is existing literature on all of these topics, no study has gone so far as to connect the dots and look into a possible correlation with rest days and travel during a season affecting the amount of injuries for individual teams. This study takes that step and collects data on man games lost, back to back games, and travel miles to look at how injuries may be caused in the NHL.

The theoretical framework made up of Circadian Rhythm Theory has substantial evidence backing it, and this study relates it to the world of hockey. After examination of the research, the hypothesis was that there will be a strong correlation between the amount of travel, back to back games played, and the amount of man games lost for NHL teams.

Literature Review

Theoretical Framework

This research attempts to discover if Circadian Rhythm Theory can help explain injuries in the National Hockey League. Circadian Rhythm Theory (hereafter known as CRT) is focused on the idea that travel causes a desynchronization of an athlete's internal body clock, or circadian clock (Venter, 2012). Circadian rhythms are internally generated rhythms that exist to keep the body's internal clock on time even when external cues are not there (2012). Circadian rhythms, located in two parts of the brain called the suprachiasmatic nuclei, have periods of approximately 24 hours (Vitaterna, Takahashi & Turek, 2001). Circadian rhythm has long been connected to physical activities that involve coordinated motor skills (Teo, Newton & McGuigan, 2011). The primary circadian rhythm that this body clock controls is the sleep-wake cycle (American Academy of Sleep Medicine, 2008). It allows organisms to time their behavior without external conditions (Venter, 2008). However, constant travel can disrupt this internal rhythm (Forbes-Robertson, S., Dudley, E., Vadgama, P., Cook, C., Drawer, S., & Kilduff, L. 2012). Disruption of this internal clock have been shown to impair the mental and physical well being, as well (Vitaterna et al., 2001) More importantly, the consistent strain on muscle tissue because of a busy league schedule, constant travel, and lack of rest caused by the disruption of circadian rhythms can cause muscle fatigue (Venter, 2008).

Travel's Affect on the Body

Rachel Venter researched sleep and looked into factors that affected sleep (2012). One of the biggest factors was travel. Venter theorized that the sleep disruption was because of the cramped conditions, dehydration that often comes from long trips, reduced pressure, vibrations, noise, flight anxiety, and whole body stiffness that comes from the inactivity that comes with flights. Her study is backed up by the study of R. Manfredini, S. Manfredini, Fersini, and Conconi (1998). They found that sleep was heavily interrupted by travel, and other symptoms of long travel included disruption of fine motor skills, and difficulty concentrating (1998).

Drust, Waterhouse, Atkinson, Edwards, and Reilly (2005) also agree with the idea that an athlete's performance could be greatly influenced if their circadian clock is thrown off by transmeridian travel.

The American Academy of Sleep Medicine say that a Circadian Rhythm sleep disorder may occur because of jet lag (2008). Side effects of this include a hard time initiating sleep, waking up frequently, and non-restorative sleep or poor quality of sleep. The timing of takeoff and travel can make circadian sleep disruption worse, leading to excessive daytime sleepiness, disorientation, and severe fatigue (D'Alonzo & Krachman, 2000). Those that travel frequently, such as athletes, may have chronic symptoms (2000). This knowledge is important because of how crucial sleep is to muscle recovery (Venter, 2008). Sleep helps with psychological and physical restoration of the body, as well as maintenance of the immune system (2008). A lack of sleep in athletes has been found to hinder recovery of muscles as well as impair mental facilities (Skein, Duffeld, Minett, Geoffrey, Snape & Murphy, 2013).

Some studies that looked in depth at this topic in relation to sport are included in this paper. These studies are substantiated by other research and are detailed enough to be used as a focus for this paper. Steenland and Deddens looked in depth on the effect travel and rest has on professional athletes (1997). Over an eight year period, they studied 8,495 NBA games to analyze the effect that long travel and short rest may have on an athlete's performance in game situations. They analyzed the data and found overwhelming evidence that travel and rest are important factors in performance, particularly for the away team. Data showed that teams benefitted significantly from having more than one day, and peaked with three days' rest. It was clear from the research that the away team was negatively affected by the travel, giving the home team a clear advantage. The authors surmised that the lack of sleep or lack of time for muscle repair was to blame for the negative impact on the traveling team (1997).

In the context of a different sport, Winter, Hammond, Green, Zhang, and Bliwise looked into circadian advantage in Major League Baseball. Analyzing results over a ten year period, they looked at the 5,042 games that had teams at different circadian times – as in, one team that was more internally synchronized than the

other. They found that the team with the circadian advantage won 52.0% of the time. This was significant, but not more significant than something like home field advantage (53.7% winning percentage). However, the authors did find that teams with a 3 hour circadian advantage (the greatest possible distance between time zones) had a winning percentage of almost 61% (2009), indicating a greater effect with greater distance and greater time traveled. While this does not deal strictly with injuries, this study shows how much travel can affect athletes. The affect of travel on teams can also be seen in the study conducted by Smith, Guilleminault, and Efron (1997), who found that NFL teams with a circadian advantage win substantially more than normal.

The reason for this may be because athletes just have a stronger rhythmicity than others. Davenne (2008) states that athletes have a stronger rhythmicity than those that are usually sedentary because of the amount of physical exercise they receive. Therefore, when their rhythms are thrown off, the effects are exacerbated by the fact that their rhythms are normally so strong (2008). Davenne also states that because of this, athletes need even more rest and sleep than sedentary people (2008). While a number of studies have shown the effect that sleep deprivation can have on an athlete, the study by Mah, Mah, Kezirian, and Dement (2011) looked into the effect of extended hours of rest/sleep over the course of days and weeks. The study was conducted over the course of two collegiate seasons at Stanford University. Subjects were selected from the men's basketball team at the University, and sleep duration, athletic performance, reaction time, daytime sleepiness, and mood measures were recorded during the baseline part of the study as well as after, when subjects had extended sleep patterns. Not surprisingly, the subjects responded in a very positive manner to extended sleep. Their minimum reaction time decreased significantly, and they showed a significant decrease in the number of attention lapses during performance. The subjects' shooting percentage significantly increased for 3 point attempts, free throw shooting, and speed during sprints drills run in practice increased significantly as well (2011). The study done by Edge, Mundel, and Short goes even further, looking into the effects of sleep deprivation on muscle repair and athletic performance (2009). Their results showed that sleep deprivation has a negative effect on the day to day recovery of leg strength and performance of those muscles. Edge, Mundel, and Short theorize that it was because

sleep loss slows down the repletion of muscle glycogen, which would make performance of those muscles decline steeply without proper rest and recovery (2009).

Correlation between Fatigue and Injuries

This research is critical because of a strong association between fatigue and subsequent injuries (Murgia, 2013). The most common injuries in hockey are sustained to the head, shoulder, elbow, wrist, back, hip, and knee (Stuart, n.d.). Repeated exposure to physical activity without time for sufficient rest and recovery can have a severe impact on the body, and many of the body parts at the most risk for hockey players are also susceptible to injuries sustained because of repeated use (Murgia, 2013). A sustained strenuous physical activity such as sport leads to muscle fatigue, which in turn leads to an impairment of the body's ability to neutralize stress placed on bones. The frequency, magnitude, and rate of exposure can lead to a muscle fracture (2013). Research done by Benjaminse, Habu, Sell, Abt, Fu, Myers, and Lephart indicates that fatigue can lead to an increased risk of injuries to the knee because of a decrease in knee join flexion, placing more stress on the knee (2007). Quadriceps and hamstring fatigue can lead to lower body injuries as well (Thomas, McLean, Palmieri-Smith, 2010). The fatigue changes the mechanics of an athlete's quads and hamstrings, placing stress on the lower body, particularly the knee (2010). More side effects of fatigue and a lack of rest time include cartilage deterioration, tendon and ligament failure, and an overall muscle fatigue and muscle failure without proper time to recuperate the body (Murgia, 2013). Yoshikawa, Mori, Santiesteban, Sun, Hafstad, Chen, and Burr (1994) did a study that suggested bones become susceptible to rapid failure when muscles become fatigued (1994). Murgia cites Chi and Hodgson's model that suggests that the reason for injury is because muscles are not producing adequate force to support movement activity, not decreasing impact forces, and not attenuating forces acting on bones and other structures within the body (2013).

Takarada (2003) conducted research on muscle damage that occurred after a rugby match. The study was done in the East Japan Company Rugby Football League and focused on which muscles were most fatigued by the strenuous activity that took place in competitive game situations (2003). It was found that the contact aspect of

the game, along with the repeated eccentric muscle contractions that are associated with running/sprinting were the cause of the majority of the muscle damage. This muscle damage greatly reduced the muscle's ability to generate force, which lowers performance. Additionally, it increased the risk of future injuries such as strains, tears, ligament damage, etc (2003). In Dupont, Nedelec, McCall, McCormack, Berthoin, and Wisloff's study (2010), they found that a congested schedule lead to more injuries in soccer, as well. Playing more than a game or two a week played a significant role in increased injuries, primarily to the lower body (2010).

Looking at the research on why the injuries occur, it is easy to relate these studies back to hockey because of how physical hockey is and the strain that skating at such a high speed puts on an athlete's body. Looking at how fatigue affects athletes in other sports, it is clear how the research question makes sense in the context of hockey, as well.

Impact of Injuries on a Team's Success

Another reason this research is important is because of the impact that injuries have a team's overall success. The research of Hagglund, Walden, Magnusson, Kristensson, Bengtsson, and Ekstrand (2013) show us that increased injuries to a team significantly impact overall team performance. Hagglund et al. looked at 7792 injuries during 1,026,104 hours of UEFA match play and found that a team with decreased injury rates and decreased injury severity had a statistically better chance at improved team play compared to the previous season (2013). The study found that a majority of the injuries suffered were to the hamstring, ankle, and knee joints (2013). The risk of these injuries occurring can be cut down through more rest periods and less constant strain (Thomas, McLean, Palmieri-Smith, 2010). A study on Qatari professional soccer backs up these findings (Eirale, Tol, Farooq, Smiley, Chalabi, 2012). The study by Eirale et al. also found a strong positive correlation between teams at the top of the league standings and low injury rates. Hagglund et al. theorized that this was because it gave coaches less options for lineup changes and often forced players with less skill into a bigger role (2013).

Purpose and Research Question

The existing literature clearly states that traveling can lead to fatigue of the body, and that fatigue can lead to injuries in athletics. However, this research does not go any further in terms of making connections between travel miles and quantifying the amount of injuries. Using this research and performing primary data collection, this paper attempted to make a connection between travel miles, back to back games, and man games lost in the National Hockey League through correlation analysis.

Method

Sample

This study used 28 teams in the National Hockey League for two full seasons. Results were used from the 2010-2011 and 2011-2012 seasons. These seasons were chosen because they represent a normal schedule in a regular 82 game season. While 2010-2011 was an Olympic year, travel miles and back to back games were not affected. The statistics for this study are easily accessible through the research of Dirk Hoag, who has compiled the stats on travel miles and back to back games for the past several NHL seasons.

The Atlanta Thrashers moved to Winnipeg to become the Winnipeg Jets after the 2010-2011 season, meaning the sample from this franchise would be flawed. For the sake of eliminating any potential confounding variables, this study excluded that franchise data. The Philadelphia Flyers did not publish consistent injury reports throughout both selected seasons, and as a result their data is flawed and will be excluded as well. The final study included 28 NHL teams.

Variables

This research paper examined three variables. The first of these was the amount of travel miles that each team traveled for the 2010-2011 and 2011-2012 seasons. This is defined as the total amount of miles traveled per team, including the travel home after a road trip. There is a large difference between the team that travels the least amount per year and the team that travels the farthest per year, which yielded a sample wide and varied enough to show a statistical correlation. The second variable in this study was the amount of back-to-back games that are played by each team. These were defined as the amount of games played on consecutive days (for

example, a game on a Friday night and a game on Saturday night). Like travel miles, there was a wide enough sample in each team's individual schedule to make a possible connection between the independent variable and the dependent variable. The dependent variable in this study was man games lost. This was defined as man games lost to injury (for example, if a player misses three games then that equals three man games lost). An NHL season is 82 games long. The significance of man games lost can be illustrated by envisioning that for every 82 man games lost, that is an entire starting player missing from the lineup. For example, the Buffalo Sabres had 328 MGL during the 2011-2012 season (Currier, 2012). That ends up being four players missing for every game of the season! The Boston Bruins only had 128 MGL, or 1.5 players missing each game. This shows how significant MGL is as a statistic, and how large a competitive advantage a team may have because of having fewer MGL during a season.

To protect the integrity of the sample, this study did not include healthy scratches (players who are healthy but are not inserted into the lineup) or suspensions (players suspended by their team or the league for detrimental conduct on or off the ice).

Data Collection Plan

Data collection was primarily from the website SBNation.com. SB Nation brands itself as the largest, highest quality collection of grassroots sports communities (SB Nation, 2013). SB Nation has hundreds of sports communities that contain quality content that delivers the ultimate fan experience. What really provides legitimacy to SB Nation is their collection of editors, which includes five of Forbes' top ten influencers in the business of sport (Dvorkin, 2011). This study also used statistics from SB Nation's Dirk Hoag, managing editor of the blog On the Forecheck. Hoag writes frequently about statistics in the National Hockey League, compiling obscure statistics that aren't available to the general public. In fact, one of Hoag's stats compilations was used by former NHL player Sean Avery in his arbitration case vs. the New York Rangers in 2008 (Simon, 2008). In addition, Technorati, a massive blog indexing search engine, rated On the Forecheck as the 52nd best sports blog in the

world in 2012, and the 4th best hockey blog. Charlie Saunier, producer of the Nashville Predators' Radio Network, also named On the Forecheck as one of his go to sources for show preparation: "OTF is a must read for me every day. As a member of the media I have used OTF for show research and breaking news while live on the air." ("About - Dirk Hoag, Notes, Quotes, & Awards" 2010, para. 3)

Statistics for this study were taken from Hoag's annual NHL Super Schedule blog post, which compiles a list of travel miles per team and back to back games played per team. The fruit of Hoag's work can be found in Appendix A and Appendix B. The spreadsheets give data on the 28 selected teams' travel miles, back to back games, and man games lost for 2010-2011 and 2011-2012 (please note that the spreadsheets are divided by conferences). At the bottom of the spreadsheets the correlation values are listed for travel miles and back-to-back games.

Information for injuries for each individual team was found using the website ManGamesLost.com that tracks man games lost for the NHL, NFL, NBA, and other major sport leagues around the world. This website keeps track of team reports throughout the year, making it the most accurate source for this stat. This website is also used by a variety of media sources, including the USA Today (Allen, 2014), Detroit Free Press (Sipple, 2014), The Hockey News (Richardson, 2014), and Puck Daddy (Leahy, 2013). The consistent use by respected media sources gave this website more than enough credibility for this study.

Data Analysis

Tests of Association are tests that measure whether two or more variables are related (Gratton & Jones, 2010). In this study, the variables are travel miles, back to back games, and man games lost. Correlation analysis looks into the relationship between two variables and determines if there is a positive or negative relationship between them (2010). A positive correlation exists where high scores on one variable correspond with another. Correlations range from -1.00 to +1.00. -1.00 indicates a perfect negative correlation (as one variable goes up, the other goes down), 0.00 indicates no connection whatsoever, and +1.00 indicates a perfect positive correlation (as one variable goes up, so does the other) (2010). A strong correlation occurs when r = .6 - .9, a moderate

relationship occurs when r = .4 - .6, and a tenuous correlation occurs when r = .2 - .4 (2010). It should be noted that correlation cannot determine causality.

The data for this paper (which can be seen in appendices A and B) was tested using IBM's SPSS with a bivariate correlation for all variables during the 2010-2011 and 2011-2012 season. Individual conferences were tested to eliminate any possibility that the geographical differences might throw off the data. The variables in this research are continuous variables, and therefore a Pearson coefficient was used. Justification for a correlation analysis can be seen through other studies such as the ones conducted by Kochanska-Dziurowicz, Janikowska, Bogacz, Bijak, Stanjek-Cichoracka, Mazurek, & Gabrys (2013), and Sharma, Tripathi, & Koley (2012). Both studies successfully used a correlation analysis to test their data.

Results

The hypothesis for this paper was that the variables would be positively correlated in a significant way, and that as travel miles and back to back games went up, man games lost would go up as well. However, the data (which can be seen in appendices A and B) shows the opposite in many cases. This study was looking for significant positive correlations to prove its hypothesis, but when analyzing the data the correlation values were negative in many cases. Travel miles were negatively correlated with MGL in the Western Conference, r = -.050 and -.167 for 2010-2011 and 2011-2012 respectively. The correlation values for back-to-back games were also negative, r = -.038 in 2010-2011 and -.110 in 2011-2012.

The Eastern Conference had inconsistent results for travel miles and MGL, r = -.595 and .319 for 2010-2011 and 2011-2012 respectively. For back-to-back games in the Eastern conference, r = .281 and -.098 for 2010-2011 and 2011-2012. While the East had more positive correlation values, there was nothing consistent enough to warrant any sort of conclusion from the numbers. The correlation values of .319 and .281 in the Eastern Conference would have been significant enough to draw some sort of conclusion had they been consistent with the rest of the correlation values, but many of the other values were negative. The correlation values told a story much different than the literature review. In the end, the only consistent relationship between the variables was

a tentative negative relationship. While the end result may be a product of a small sample size (n=56, but only two seasons worth of data), there is no data consistent enough to merit a confident conclusion.

Discussion

After analyzing the data, it is clear that the hypothesis for this paper was incorrect. Not only are travel miles and man games lost not correlated, neither are back to back games and man games lost. After looking at previous research, it was easy to look at the variables and conclude that they had to be correlated; the data shows the opposite. However, while the hypothesis for this study was not correct, that does not diminish the previous research done on the subject of fatigue, injuries, and rest periods in sports. Future studies may be able to use the same research to explore different facets of the game to possibly predict injuries.

Limitations

There were some limitations in this study, none bigger than the problem with hockey masculinity and possible underreporting of injuries in the NHL. In Allain's study on Canadian hockey masculinity (2008), Allain discusses how far players will go to prove their masculinity and how any expression of sensitivity or weakness is degraded. This culture is developed in the locker rooms (2008), and while this article discusses only Canadian men's hockey, another study by Williamson and Goodman (2006) shows that concussions in youth hockey are extremely under reported because of the culture of hockey and the pressure to play through injury. The media does its best to propagate the idea of hockey masculinity, and the NHL itself brands itself as a sport of warriors and gladiators, the toughest of the tough (Gee, 2009). 80% of all NHL teams have North Americans that serve as Captain (NHL.com), in part because Europeans are marginalized at times in the locker room because they haven't learned the ins and outs of North American hockey culture (Allain, 2008). Because of this culture in hockey, the media pressure, and the history of toughness in the league, NHL players have a tendency to play through injuries instead of undergoing rest and treatment. There is a history of players in the league sacrificing not just their heart

and soul, but their bodies to win at all costs, and players today continue that tradition (Hackel, 2013). Some examples of this from the 2012-2013 NHL playoffs include: Francois Beauchemin playing with a torn ACL (Irwin, 2013), Nick Bonino playing with a torn hamstring (2013), Bryan Bickell playing with a knee strain (2013), Michal Handzus playing with a broken wrist and torn MCL (2013), Patrice Bergeron playing with a broken rib, torn cartilage, and a separated shoulder (Brigidi, 2013), Nathan Horton playing with a separated shoulder (Irwin, 2013), Dustin Brown playing with a PCL tear (2013), Marc-Edouard Vlasic playing with a broken foot (2013), and Brandon Prust playing with a separated rib (2013). Therefore, while this study attempts to quantify injuries as man games lost, there is no way to completely quantify injuries because players will play through injury, if possible. The result is that the number of man games lost are a conservative quantification of injuries in the National Hockey League.

Another limitation is that the available data for this research was scarce. There are very few records of man games lost, with the exception of the website used. That website has only kept stats on injuries for a few years. Because of this, the data may be skewed. If the research had used a decade of data instead of two seasons, the results may be different. The website that keeps track of man games lost was also at the mercy of the individual NHL teams to keep up with their injury records and record them accurately. While the Philadelphia Flyers were excluded from the dataset because they did not keep consistent reports, it is possible that other teams did not have accurate data.

Finally, the numbers on man games lost included all players with injuries – even those who had pre existing conditions and were out for the entire season. This may have inflated some numbers and skewed the data. Unfortunately, there is no way of excluding those players from the injury reports, or even knowing if they did inflate the data. While there is no way to know how the results would be different with data that excluded those instances, it is worth mentioning.

Significance

The surmised significance touched on the ideas that, if the hypothesis was correct, the results would influence scheduling, coaching decisions, etc. However, as the data shows, more travel miles and back to back games do not mean more injuries in the NHL. While scheduling does not affect injury, according to the data, it still does affect fatigue. While the data would have been of much greater significance had it interpreted to more injuries, fatigue is still bad for the game of hockey as it leads to a worse product on the ice. Of the big sports in North America, it needs help the most in growing the game. Coaching decisions are also unaffected by the data. While fatigue leading to injuries may have completely changed how coaches made player decisions (resting on certain days, not playing them in too many back to back games, etc.), fatigue is still a factor that needs to be considered when looking at how to manage players. When players are tired their muscles do not work as well, and therefore they perform worse. While it does not seemingly affect muscle strains, tears, broken limbs, etc. as surmised, it still does affect their bodily health and performance.

Future Studies

In the future, research should be done on how injuries affect players the more they play during individual games. A study by Lassonde & Beaumont (2008) shows that in game fatigue can influence concussions in players. Their research suggests that ice time over the course of a season was not a good predictor for concussions but that ice time in individual games was. This shows that there is quite a bit of research that needs to be done in the area of injuries in hockey and possible predictors. In game factors may be a better injury predictor than variables assessed over the course of entire seasons.

Future studies may also want to look at data over the course of several seasons. While the results of this study were unexpected, the method was sound. A future study may want to take data from the last decade or so, if the data is available.

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Appendices

Appendix A: Eastern Conference travel miles, back-to-back games, and correlation values

	2010-2011 Season			2011-2012 Season		
East	Travel Miles	B to B	MGL	Travel Miles	B to B	MGL
New York Islanders	28,210	20	614	32,410	13	351
New Jersey Devils	27,152	20	425	28,957	15	243
Pittsburgh Penguins	28,948	17	348	33,439	15	355
New York Rangers	29,355	18	328	36,385	14	235
Florida Panthers	43,144	15	317	52,751	14	340
Washington Capitals	32,401	15	251	37,969	13	248
Montreal Canadiens	33,224	16	236	39,174	13	439
Buffalo Sabres	30,347	22	226	35,911	21	328
Ottawa Senators	32,157	16	223	33,915	17	225
Toronto Maple Leafs	33,470	14	184	32,239	17	239
Tampa Bay Lightning	40,522	17	170	43,717	10	311
Boston Bruins	35,673	14	105	33,770	13	135
Carolina Hurricanes	40,874	21	65	38,114	16	199
Correlation Value	***-.595***	***.281***		***.319***	***-.098***	

Appendix B: Western Conference travel miles, back-to-back games, and correlation values

	2010-2011 Season			2011-2012 Season		
West	Travel Miles	B to B	MGL	Travel Miles	B to B	MGL
Colorado Avalanche	44,190	14	474	48,945	10	210
Minnesota Wild	50,805	19	421	42,860	11	388
Calgary Flames	48,004	13	361	49,104	10	389
Vancouver Canucks	51,213	11	360	46,826	11	271
Nashville Predators	42,379	13	346	39,534	11	143
St. Louis Blues	41,473	17	311	38,781	17	316
Edmonton Oilers	50,309	11	279	50,006	12	248
Detroit Red Wings	39,793	14	256	42,865	14	223
Columbus Blue Jackets	44,600	18	239	42,831	16	409
Los Angeles Kings	40,430	13	170	55,591	15	168
Anaheim Ducks	47,838	15	168	50,296	13	200
San Jose Sharks	56,254	14	166	43,994	14	148
Dallas Stars	46,244	12	158	49,622	14	172
Chicago Blackhawks	40,498	18	144	39,288	17	168
Phoenix Coyotes	53,843	16	127	49,192	13	181
Correlation Value	***-.050***	***.038***		***-.167***	***-.110***	

Thank you for taking the time to read this paper! If you made it this far, bless you. This research paper represents hours upon hours of work, a great deal of stress, and more than a few sleepless nights. While the hypothesis for this paper turned out to be incorrect, I am still extremely proud of how I pulled this topic together and how the end result turned out. As one of my professors kindly pointed out, I am not a student writing a paper, I am a new researcher exploring topics. As a new researcher I realize that this isn't the best paper in the world, but it is by far the most in depth, intensive project I have ever taken on and taking that into account I am very happy with the result.

- Aaron Kneeland