

## **Chapter 13 : Anatomy for Skateboarding II**

An in-depth analysis with more data and a summary of anatomy information learned while skateboarding from June-December, 2024.

<-very rough draft, still have to complete the introduction, background, results, conclusions.

### **Introduction**

### **Background**

<todo: intro paragraph>

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The quadratus lumborum attaches the iliolumbar ligament and iliac crest to the twelfth rib and Lumbar 1 through 4 via superomedial positioning and is inelastic since its primary function is to connect the legs to the torso and assist in posture. Exercise induced lower back pain is often mistaken for this abdominal wall muscle and long term damage could cause respiratory illness or require hip replacement leading to death or significant disability (70, 88).

33, 34, 35

## Statistics

42	Analyzing and Interpreting Data From Likert-Type Scales
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89 Maybe you could make an index combining calories burned and hours worked as an estimate of stress and estimate alcohol and calorie intake.

2 3	Kurtosis as Peakedness, 1905-2014 R.I.P.	Maintains that kurtosis is not a measure of peakedness of a distribution but rather a measure of existing outliers in a sample or propensity to produce more outliers in a population.	<a href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4321753/">https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4321753/</a>
		High measures of kurtosis (over 3) have heavy tails or outliers while under 3 would have lighter tails/outliers	<a href="https://www.itl.nist.gov/div89/">https://www.itl.nist.gov/div89/</a>

		in the normal distribution.	<a href="https://stats.oarc.ucla.edu/spss/faq/what-does-cronbachs-alpha-mean/">8/handbook/eda/section3/eda35b.htm</a>
		Cronenbach alpha coefficient - measures internal consistency among a survey	<a href="https://stats.oarc.ucla.edu/spss/faq/what-does-cronbachs-alpha-mean/">https://stats.oarc.ucla.edu/spss/faq/what-does-cronbachs-alpha-mean/</a>
		ANOVA - ???	<a href="https://sphweb.bumc.bu.edu/otlt/mph-modules/bs/bs704_hypothesis_testing-anova/bs704_hypothesis_testing-anova_print.html">https://sphweb.bumc.bu.edu/otlt/mph-modules/bs/bs704_hypothesis_testing-anova/bs704_hypothesis_testing-anova_print.html</a>
		chi-test - categorical data	<a href="https://support.google.com/docs/answer/7004263?hl=en&amp;ref_topic=3105600">https://support.google.com/docs/answer/7004263?hl=en&amp;ref_topic=3105600</a>
2 4	A Language, not a letter: Learning Statistics in R, Chp 23: What is ARIMA	ARIMA is for data that is stationary or has variance, mean, and autocorrelation that does not change over time. This page provides historical backgrounds of the formula (not in depth).	<a href="https://ademos.people.uic.edu/Chapter23.html">https://ademos.people.uic.edu/Chapter23.html</a>
2 5	NIST Engineering Statistics Handbook: 6.4.4.2. Stationarity	Briefly describes what stationarity is with two graphs and one equation.	<a href="https://www.itl.nist.gov/div898/handbook/pmc/section4/pmc442.htm">https://www.itl.nist.gov/div898/handbook/pmc/section4/pmc442.htm</a>
2 6	Penn State Stats 510: Section 4.1: Seasonal ARIMA models	Provides example calculations for the seasonal ARIMA model. SARIMA is used for data that has seasonal fluctuations and would be most applicable to yearly data. Maybe one could	<a href="https://online.stat.psu.edu/stat510/lesson/4/4.1">https://online.stat.psu.edu/stat510/lesson/4/4.1</a>
		apply the techniques to differences in >30 daily values in the same season but with values that differ during the time of day? That last part is speculation I haven't read too deeply.	
2	A Systematic Review of Time Series	Literature review on several hundred papers on deep	<a href="https://www.no">https://www.no</a>

7	Classification Techniques Used in Biomedical Applications	learning for large, non parametric datasets. A combination of several algorithms performed exceptionally well in prediction tasks	<a href="https://bi.nlm.nih.gov/pmc/articles/PMC9611376/">bi.nlm.nih.gov/pmc/articles/PMC9611376/</a>
		but the number of data points are in the several thousands. It is worth further investigation because of Gaussian Process Latent Variable Models which attempt to recognize patterns	
		by shape, thereby reducing dimensional complexity and computation power needed.	
2 8	Non-parametric inference	Defines non parametric as a group of statistical tests that use data with large and infinitely-dimensional models.	<a href="https://statistics.berkeley.edu/research/non-parametric-inference">https://statistics.berkeley.edu/research/non-parametric-inference</a>
2 9	Penn State Stats 462: Applied Regression Analysis. Lesson 10: Autocorrelation	For use in time series data when typical formulas fail to find any trends. The chapter includes many references to formulas and explanations.	<a href="https://online.stat.psu.edu/stat462/node/188/">https://online.stat.psu.edu/stat462/node/188/</a>
3 0	UCLA Advanced Research Computing. Statistical Methods and Data Analytics. FAQ: What's with the different formulas for kurtosis?	Provides three formulas for kurtosis calculation.	<a href="https://stats.oarc.ucla.edu/other/mult-pkg/faq/general/faq-whats-with-the-different-formulas-for-kurtosis/">https://stats.oarc.ucla.edu/otother/mult-pkg/faq/general/faq-whats-with-the-different-formulas-for-kurtosis/</a>
3 1	NIST Engineering Statistics Handbook: 1.3.5.11. Measures of Skewness and Kurtosis	Another referenced source for kurtosis and skewness formulas	<a href="https://www.itl.nist.gov/div898/handbook/eda/section3/eda35b.htm">https://www.itl.nist.gov/div898/handbook/eda/section3/eda35b.htm</a>
3 2	International Encyclopedia of Statistical Science. Skewness	Another college reference for skewness.	<a href="https://lbj.utexas.edu/sites/default/files/file/news/Skew.pdf">https://lbj.utexas.edu/sites/default/files/file/news/Skew.pdf</a>

## Methods

Over the course of learning skateboarding tricks during 2024, there were four periods of intense exercise followed by recovery. A prediction model will be applied for data filling the second period where no data was collected to discover relationships between weather, diet, and exercise. The implications for exercise forecasting has the potential for disastrously long lasting bodily injuries when applied to consuming media where behavior modifications are inserted. Applying elite Olympic style psychological motivation to normal people is severely annoying at best and can lead to mental instability. It is therefore essential that extensive computer science statistics classes from a graduate school background in a research social science would be a prerequisite before undertaking any experimental behavior modification regiment without guidance from exercise scientists and other trained professionals. Automated behavior modifications based on ephemeral social science information systems may have undesired effects.

### *Study Period*

While writing the Python package as described in Chapters 8-10 that parses and implements several data summary functions for the processing of the CSV from Chapter 11, it was discovered that additional information would need to be collected for a more robust sample to use parametric statistics. Additional data was collected for 100 days from July 22nd until October 29th 2024 in an identical table format with the inclusion of one day forecasting for pain with the intention to build a prediction model based on observed calories, macronutrients, weather, and exercise to compare with human estimates. The prediction model will be applied

from June 1st until July 21st for data filling in the period of skateboarding where no information was collected. The climate for the upper midwest states where this experiment took place during the spring is typically humid with moderate temperatures and rainfall. The summers are drier with temperatures ranging from 80-95 while the fall gradually becomes colder with long stretches of rain. The year's news was a presidential election cycle with significant bombardment of political propaganda ranging from subtle to unavoidable.

### *Bodily Observations*

Towards the tail end of the second exercise era during the data gap, it was observed in textual notes that on June 27th the right lower spinae was sore and was thought to have originated from excessive core activity in addition to skateboarding. The deep abdominal wall around the right quadratus attaching to the hip was consistently sore during high school powerlifting and in college while performing the squat, power clean, and playing football or rugby. In 2009 doctors took X-rays and found no spinal misalignment and thought that it was multifidus pain. Physical therapy was recommended with exercises to strengthen the gluteus medius and intrinsic external hip rotators. A chiropractor increased blood flow to the area with similar stretches and the pain was reduced by resting and stretching.

In late June, 2024, the left gluteus medius, maximus, biceps femoris, gastrocnemius, soleus, and calcaneal tendon were also sore from overuse while switch manuailling. A freestyle skateboarding injury from doing primo to build foot muscles was the accidental removal of a foot callus while contracting the lateral head on the flexor hallucis brevis muscle. The direct cause was a haphazardly tied shoelace and sliding foot along a  $\frac{3}{4}$  foot length shoe insert. The



remedy included 3 days of stretching during an extreme varying barometric pressure induced weather event where over an inch of rain fell in 12 hours. It might be more difficult for a person in a desert or experiencing severe drought to notice the built up muscular tension without the characteristic joint pain that emerges during shifts in barometric pressure from precipitation events.

Left footed kicks -> vastus medius -> adductor tubercle??

### *June and July Skateboarding*

Perceived duration of the skateboarding sessions during the unrecorded summary data period ranged from one to two hours and typically occurred in the late morning and early afternoon between 0900 and 1300. Observational notes included a warmup and guideline for gradually progressing into more complicated maneuvers. The indoor section of the warm up took 10 minutes and included dynamic movements with 5-10 meters of high knees, butt kickers, high knee karaoke, lunges, lateral lunges, and 2-4 sprints at increasing speed. Once toeside and heelside primo were mastered, more complicated freestyle tricks like rail  $\frac{3}{4}$  flip out and the old school kickflip were learned with less consistency. At least one regular or switch ollie was done indoors before leaving.

Once outside, stationary ollies and tricks that needed to be worked on were practiced for five to ten minutes. While moving, 2-4 regular or switch stanced frontside and backside turns were performed before an equal amount of multidirectional nose and tail pivots. Occasionally regular manuals up to 10 meters were included depending on muscular soreness. If several ollies

were anticipated, moving squats and hippie jumps were done to get a feel for the board until capable of gradually higher and faster moving ollies. The primary goal during this period was to successfully jump up a curb regular stanced and was finally achieved with some consistency regular and switch stanced during a period of low muscular soreness in early July. Ollieing off a curb is significantly easier with one to two meter distances achieved. Frontside 180s were then performed until pushing home before the ensuing dehydration and exhaustion. Switch stance was much more difficult and not performed with consistency. There were several bruises that were accumulated from falling on different occasions. Once back inside, abdominal work was performed with a yoga ball for pike-ups, oblique twists, leg raises, and crunches. It was thought during these months that debilitating inflammation in the vastus lateralis, intermedius, rectus femoris, and tensor fascia latae (TFL) destabilized the ilio-tibial tract tendons attached to the lateral knee and resulted in pain characteristic of Ilio-Tibial Band Syndrome (ITBS), as described in previous chapters. The actual cause was revealed several months later. Stretches focused on reducing ITBS by stretching the TFL, quadriceps, hamstrings, and calfs. Upper body exercises included handstands, pushups, tricep extensions, bicep curls, and barbell rows and were performed every one to two weeks with some regularity.

The usual setting was at a local college  $\frac{1}{2}$  mile away from the domicile and was selected because of the presence of security cameras and vehicles to ensure property destruction would not be blamed on the participant. This was the location until being kicked out when the student athletes began returning. The real reason might be because ollie trick audio frequency is too similar to gunshots which would decrease the efficiency of an automated security system. In early July, temperatures reached nearly 100 with heat index and forced practice inside to avoid further muscular damage. Technique practice included toeside to heelside rail to  $\frac{3}{4}$  flip out and

were performed until landing on the bottom of the new board broke it at the nose. The steepness of the nose and tail along with modifying the nose for more length are thought to have been the cause. One stationary kickflip was landed on the larger board with an additional one or two foot drags after several days and a handful of hours. Ability progressed from having difficulty ollieing fast at the end of April to doing regular and switch frontside and backside reverts, ollies up and off curbs, toe and heelside primo, manuals and regular frontside 180 and shove its.

### *June and July Longboarding*

In addition to skateboarding, distance longboarding was haphazardly performed with the intention to improve cardiovascular endurance and reduce weight. After an hour of skateboarding, the participant pushed regular and switch on the wider skate deck equipped with taller trucks and wheels as described in Chapter 11 for about one hour on a 4.9 mile route as estimated by Google Maps through city dwelling and suburban landscape. A moderately sloped one half mile hill whose sidewalk runs parallel to a state highway was used to practice balance at speed shifting from riding on tail to nose wheels over cracks in rapid succession. That technique was included to improve the skater's comfort moving the board in an ollie motion at speed and assisted in identifying an improved foot position towards the nose.

### *June and July Miscellaneous Exercises*

Occasional juggling and running occurred during off days to improve hand foot eye coordination and build more cardiovascular endurance. Juggling practice is a good way to

actively stretch without overexerting inflamed muscles since bending to pick up dropped balls is a frequent occurrence. Experimenting with running form for more endurance by using smaller muscles at varying times contributed to runners' knees or lower quadriceps tendonitis. During the late afternoon and at night, more thorough stretches were performed to alleviate muscle soreness and focused on IT band stretches such as the straight leg cross stance, cross leg bend, sitting twists, lying leg raises, and knee twists as described in several websites (<https://health.clevelandclinic.org/it-band-stretches>).

The dry indoor air and continually electrified nervous system from excessive wind dried skin while skateboarding led the participant to lay in the more cold and humid basement. The lateral pelvic tilt issue was partially addressed from exercises found through websites such as (<https://www.conorharris.com/blog/the-best-resource-on-the-internet-for-fixing-lateral-pelvic-tilt>) deep primo stance squats, and focussing on leg stability while resting. The isometric exercises described on the internet are of dubious source since they are from blogs but are consistent with physical therapy recommendations from previous visits with credentialed professionals. Having a background in organized sports at a legitimate university is helpful and it is essential to not mindlessly perform exercises while exhausted to alleviate pain as recommended from programs on social media feeds. As mentioned in the previous chapters on statistics, these websites or applications are unsupervised and are making probability assumptions from the data collected through electronics including Google searches, messaging, and attention paid to watching recommended content.

### *July and August Recovery*

Around July 17th, a harder fall over an uneven sidewalk elevated from a tree root occurred while cruising and not paying attention. The hand dragged across the pavement to protect the face and recently purchased beers in a falling technique derived from youthful martial arts. The palm road rash was annoying and included scapholunate tendon stiffness in the morning after sleeping. The pain was alleviated by massaging the palmar hand and posterior wrist and temporarily caused a stoppage of upper body exercises while the wound healed. Several days later, tweezers reopened the wound and removed several fragments of rock before applying lotion that aided in healing and prevented permanent scar tissue from forming. There was no loss of handgrip strength and no swelling which indicated there were no bone breaks. Moisturizing the wound resulted in a minimal scar tissue that disappeared completely within three months.

Near the middle of July, significant right leg ITBS pain returned and forced complete cessation of skateboarding and rehabilitation ensued similar in methodology to the recorded active stretches and walking from May. Another issue emerged during this time when one of the peroneal tendons began snapping over the lateral malleolus (19). It is most likely from a slightly pronated ankle during the extension and jump from the  $\frac{3}{4}$  squat phase during ollie related tricks, manuals, and pushing the longboard switch. The right lateral leg muscle volume increased significantly from fluid while the upper posterior muscles were unable to provide consistent stabilization on the knee during exercise.

From July 17th to August 4th 2024, data thoroughness issues were discovered with the first dataset and boredom with waiting for inflammation to heal induced the decision to collect 100 more days of information. A typical day schedule starting on July 22nd until skateboarding resumed included working on this paper's code from 800-1000, practicing guitar from 1000 until 1100, walking, stretching, or longboarding for 15 to 30 minutes, and resting several hours before

juggling from 1700 until 1730 with more guitar and stretching. The palm lacerations made typing, guitar, juggling, and general hand use difficult for several days until skin gradually closed the wound. Soreness persisted in the palmar scapholunate tendon until full recovery on August 21st. Awareness of pain in both the ITBS and palm had several peaks and troughs. Without looking at pain graphs over several weeks, it is hypothesized that an equation to fit the numbers would resemble an exponentially decaying sine wave. Hourly data was not included but palm soreness peaked in the morning after sleeping and ITBS peaked several hours after recovery exercises. The last debilitating period of right lateral lower quadricep pain ended on July 29th but a period of extremely high temperatures and humidity that began July 27th through August 5th prohibited outside skateboarding. Instead emphasis was placed on controlling calorie and alcohol intake with moderately intense basement skateboarding.

July 28th was spent building up to the ollie kickflip by practicing getting into primo,  $\frac{3}{4}$  flips, rail to rail flip, and old school flips. At least one of the layers of plywood was broken when a jolt ran through the left bicep femoris tendon upon landing on the backside of the board but went unnoticed. On July 29th a rail to rail and  $\frac{3}{4}$  flip out was landed but there were several upside down board stomps. The following day was spent on single leg squats, romanian deadlifts, and lunges which initiated severely sore gluteus for several days. On July 31st, the legs were tired and landed several times on the upside down board and practice stopped when the board was broken entirely. August 1st was spent attempting regular stanced kickflips on the wider board and the next day was spent attempting switch kickflips to no success.

August 3rd a stationary kickflip was finally landed with another where the foot touched the ground. From longboarding everyday during the summer in 2015 until 2016 and landing basic shove its to a period of relatively little skateboarding from 2017-2022, it took seven months

of focusing specifically on landing a kickflip to have the necessary aerial board control to progress through basic ollies, front and backside 180's, and pop or frontside shove its. The backfoot habitually moves to the posterior from incorrect practice and can be rectified by practicing stomping on the rear leg using a fingertip instead of unnecessarily inflaming the quadriceps with a full kickflip. August 7th and 10th were spent nailing two truck holes into the broken board and sanding the jagged edge without power tools to both repurpose the material as a penny board and extend the amount of active time.

Anecdotally, August 1st was the last time the guitar was played through the same eight or nine classical songs that were practiced for nearly a year and on August 3rd a new song was site read in the morning before landing the flip. Also anecdotally, skateboard paint matching the color of the longboard was scrubbed off a curb although it was probably paint markings from the city maintenance since they use the same color. Although there is a strong correlation, this is a good example in sports psychology of correlation not being associated with causation. In neurobiology, jumping to incorrect conclusions through a downward spiral pattern of thinking during rapidly firing synapses that occurs when tired and hungry can cause ridiculous behavior.

### *August and September Skateboarding*

August 5th the identical replacement board arrived and practice resumed concentrating on BS 180s and was a reminder that stationary tricks on carpet are easy compared with performing while moving. The next day a hypothesis was formed that injuries occur more frequently and faster after skating for longer than one hour. Additional notes describe thoughts on the BS 180 and it was initially thought that transferring weight from the left to right foot as

the feet switch front and back was causing difficulty fully rotating and landing the trick. This problem was remedied by moving the front left big toe onto the medial screw furthest from the body and the right kick foot forward on the tail to prevent it from moving backwards and off while landing. The other issue was landing rigid and falling forward, caused by the transfer of momentum into the board which continued moving while the torso stopped and was fixed over the next few days by concentrating on landing with bent knees. The difficulty of this trick is not being able to see the right foot landing on the board because the torso and head are facing backwards to maintain a centered balance which is where hand eye or hand foot muscle coordination is helpful.

August 13th the right bicep femoris was sore from under rotating BS 180s by 10-20 degrees and landing with inward knee flexion or valgus. From August 15th to the 21st, focus shifted to longboarding and recovering full use of the lateral hamstrings. An interesting left gluteus medius bruise was accumulated on August 19th while practicing switch FS 180s because poor rear foot guidance allowed the board to roll counter clockwise 90 degrees and land almost primo, throwing the skater off balance and landing on the side of the wheel. Attempts to increase blood flow to the sight of internal contusion included mule kick poses and moved the fibroblastic material into the quadratus and erector spinae lower back muscles. A data gap exists between August 22nd and 25th on the pain scale but text notes indicate short 45-60 minute BS 180 practices with two days of rest between sessions. The 27th was a major success landing 10 out of the attempted 35 BS 180s. The following two days were spent practicing switch frontside 180s before falling on the gluteus medius in a similar manner described previously.

Skateboarding practice resumed for BS 180s on September 9th with an addition of upper body work which resulted in severe soreness. A new strategy was developed to avoid 7-20 day



long recovery times after skating almost every day and performing cardiovascular exercises. Since skateboarding is more similar to box jumping in plyometrics than to running, overuse injuries happen at a more frequent rate when done in excess. Five minutes are spent warming up without a skateboard and 10 minutes are focused on turns, hippie jumps, and stationary ollies before concentrating on a single trick for 30 minutes. Shin guards, knee pads, and longboard gloves were used more regularly to avoid injury and for warmth but the shin guards were too constricting and cut off blood circulation to the left peroneus longus, indicating that the calf muscle increased in volume or definition since purchase in March. High percentage landing of BS 180s was achieved by September 18th and indicated adequate proficiency. It was decided that moving pop shoves were the next trick to practice. On September 24th, stationary switch BS 180s and moving switch FS 180s along with fast turns were practiced to develop the opposite muscles.

#### *August and September Miscellaneous Exercises*

Longboarding also occurred as an alternative to skateboarding on less intense exercise days with practice focusing on regular and switch manuals along with regular backside body varial 180s and backside tail reverts to assist in acquiring skills related to ollie backside 180 while skateboarding. Duration lasted from 30-60 minutes but less distance was covered than in June and July. Juggling was again practiced throughout to stay active and avoid sitting all day and progressed from 100 four ball catches to eight five ball catches by progressing 3 ball claps, four ball flashes, and five ball flashes. This proved difficult to maintain while researching this paper and learning skateboarding, thus juggling three and alternating kicking the tennis ball

every rotation was conducted. Handstand improved to single handstand pushups for balance and significant time was spent on core exercises one to two times per week throughout both months. Very little time was spent on upper body exercises besides push ups and handstands. Since flexibility had increased to perform the front splits after several weeks, the side split variations were attempted four times by flexing the adductors and resulted in significant gracilis, magnus, longus, and vastus medialis soreness forcing the project to be abandoned.

Between good weather and excitement from landing moving pop shove its, on September 18th 7.2 miles were run at a moderate pace and resulted in several days of low stamina and an annoying blood blister that developed on the second distal phalange. The right foot unconsciously rotates laterally while tired from running, however during this long run attention was paid to keeping the foot parallel to direction which forced the first phalange to jut lateral into the second distal causing the blister. This lends further evidence to muscle imbalance being another cause of ITBS. Low nutrients and exhaustion induced lower body muscle twitching. The next day the anterior tibialis, peroneal longus, gluteus medius, TFL, abdominal obliques, spinae erector, bicep femoris and adductors were significantly sore and a severe headache developed. Although it is only the second instance of debilitating head pain, it is concerning that it happened within two weeks and it is probable that motivation to excessively exercise during pleasant weather before the severe cold of winter was an influencing factor.

### *September and October Recovery*

A resting period started August 30th and continued until September 8th with short runs, walks, and long stretches. Running was performed periodically from September 2nd through the

12th as an alternative to longboarding to avoid aggravating muscles in the peroneal tract and the swollen lateral quadriceps and revealed muscular weaknesses by exposing lower core and muscle imbalances. Walking with infrequent jumping also occurred and distances for both activities ranged from one to three miles. On September 6th a debilitating headache with nausea episodes occurred after driving four hours for a family wedding with the probable culprit being inclement weather, electrified and tired body from overuse, and high salt diet induced trapezius inflammation which was remedied by eating fast food, ice cream, and water. Another short resting episode occurred from September 25th until October 6th with minor exhaustion induced delusions. The primary complaint was general lower body and core inflammation and it was thought that improvement in switch board control by practicing downhill longboarding heelslides would help muscle coordination for switch skateboarding.

### *October Skateboarding*

Regular stanced skateboarding practice resumed on October 7th where all the learned tricks were performed adequately but struggle ensued with the pop shove it. The next two sessions were spent practicing pop shove its to marginal success before realizing the significance of the muscle mismatch between the right and left lateral quadriceps, TFL, and gluteus medius. It was noticed that landing pop shove its increased vastus medialis and intermedius soreness. Landing primo is caused either by not lifting the front foot off the nose fast enough hitting the now forward facing tail and rotating it along its axis similar to a kickflip or a tired back leg over kicking, sending the nose rapidly upwards into the front foot. It was thought that the issue

stemmed from a lack of right leg adductor control from not doing left heel slides similar to poor tail foot switch stanced ollie board control, besides overall lower leg inflammation.

For three skateboarding practices starting October 18th, switch ollies and FS 180s were practiced with conscious attention paid to guiding the board with the rear foot. Muscular soreness followed by inclement weather characteristic of the upper midwest prohibited further outside skateboarding. It was noticed while performing switch FS 180s without a board while walking that the torso was positioned too far forward or backwards indicating that the left leg is unaccustomed to the movement. An interesting effect of the skateboard analogous to kinesiology is the thermal expansion of the bearings and trucks with the rapidly changing temperature and humidity where they are stored in the basement during the fall. The cold basement would contract the metal from the bearings or truck bushings onto any residual moisture from the humidity making them stick and sound funny. An overworked person suffering brief delusions would jump to the conclusion that rival skateboard gangs were sneaking in to replace the trucks with lesser replicas.

### *September and October Longboarding*

Between September 26th and October 19th, there were eight switch downhill longboarding sessions to improve balance and board control for performing switch FS 180s while moving. Luckily the geography of this study is within a river valley with easy access to several low traffic and well paved hills for practice but similar efforts could be performed in a parking garage. Later the issue for repeated unintentional board flipping was identified as low muscle coordination on the rear ollie kick foot raising well off the board and not keeping it flat through the duration. Perhaps the downhill longboarding was entirely unneeded yet it provided a

mental changeup from practicing the same skateboarding motions ad nauseum. During this time significant effort was also placed on pushing the longboard switch and performing body varials and tail reverts. Pushing in reverse was also experimented with to improve foot and brain awareness when landing backside tricks.

### *September and October Miscellaneous Exercises*

Upper body exercises were performed once during this month and induced the aforementioned dorsal scapular nerve entrapment from scar buildup in the shoulder. Stretches targeted the levator scapulae, scalene, and rhomboid muscles around the neck and are identical to pain from previous experiences performing upper body lifts. Since more complicated skateboarding tricks increase exhaustion of small supporting muscles and decrease time spent practicing before falling, it was thought that performing a cardiovascular exercise such as running would increase stamina. The weather was good from September 18th until the 27th and five moderately distanced runs were performed but also created soreness in the supporting ankle and knee tendons. A random five stair jump with no board landed with a slight rear leg valgus was still inflamed two weeks after the attempt, confirming the idea that attempts should be kept below the waist.

The weather rapidly became more variable by the end of October and more attention was paid to why spinning to the left was more natural to right spinning. Martial arts was practiced from ages 5-12 and placed emphasis on building muscular coordination in both legs. Moderate time was spent punting and place kicking during recess and in football and probably contributed to muscle imbalance. From middle school through high school, each spring was spent spinning to

the left in the track and field events shot put and discus and is more likely the cause of increased left spin ability. Not being able to guide the board as effectively with the rear left foot in switch ollie spins is probably the main cause and right direction spinning mimicking track and field throws occurred during October. There were around ten of these exercises with duration from 10-30 minutes.

### *October Recovery*

The longboard, wide skateboard, and traditional skateboard gear were cleaned and the highly detailed pain chart, nutrition information, and exercise schedule tables ceased tracking by the end of the month. The left leg muscular coordination was improved during the last few weeks of inclement weather by kicking a rugby or tennis ball with the left foot. Cardiovascular endurance was improved by longboard pushing in the switch stance. The next few months were spent healing the quadriceps through building strength and volume in the gluteus and hamstring muscles and is covered in more detail using a reduced tabular setup in a different chapter.

### **Nutritional Observations**

Diet information was included in a table with columns that were identical to Chapter 11. They included information tracking the date, calories, weight and alcohol servings. There were also summarized categorical fields for observed weather at the time of skateboarding with humidity and temperature based entirely on the entity's perception. Exercise intensity was binned into three numbers with 0 indicating no calories burned, 1 being 1-250, and 2 being greater than

250 and was estimated by using online calculators

(<https://www.calculator.net/calories-burned-calculator.html>). Salt, fat, carbohydrate and protein was estimated on a low to high scale of one to five with the highest number being an arbitrary opinion on the amount of micro or macronutrient consumed.

Body weight was measured every one to two weeks and varied from 190-195 pounds. The inconsistency is because weight gain or loss was not the goal of this data collection period and more to provide a reminder to eat more or less calories. Losing weight might reduce muscular volume and increase the risk for catastrophic injury while losing fat would decrease padding to absorb physical force during hard falls. For example, on August 8th it was noted that bodily definition from moderate rehabilitation exercises, adequate nutrition, and low drinking had reduced the fat deposits around the lower core muscles to a level characteristic of an amateur bodybuilder and five beers were immediately consumed to counteract this effect to great amusement.

From the Neurobiology textbook and an Anatomy book, considerable time was spent describing cellular absorption and release of elements such as the role of potassium forcing salt from cells to speed up the transfer of information to the brain through nerves. A possible strategy would be to eat salt and wait several hours to pass through the stomach and transfer to inflamed areas before consuming potassium foods to increase the efficiency of moving minerals. One example during this experiment included hypernatremia or high blood salt level and alkaline mouth from high salt and not enough water from exercise leading to more consumption of potassium and drinking more water. This had three effects and included highly acidic or foul smelling leftover food, urinating every 30 minutes for several hours, and hyponatremia or low salt induced mild dehydration after exercising the next day. The physical evidence of these

conditions included observing the foods consumed, bodily bloating, and dry mouth with sensitive teeth. Stomach is usually acidified by drinking beer, which would not happen if calorie reduction through alcohol cessation occurred and could potentially impact tooth decay.

The textbook was specifically describing nerve signals but the superficial level understanding of dietary sciences and cellular biology could be applied to consuming large amounts of protein and carbohydrates to immediately assist in muscle repair after exercise followed by fiber to aid in digestion. Lack of knowledge in sports nutrition meant that tracking micronutrients might actually take more mental energy and be detrimental for athletic performance. The options include hard coding each food, writing a web scraping program, or using a 3rd party application and would all require excessive time transferring information to usable formats for analysis and are beyond the scope of this chapter. Ignoring economic constraint, it is hard to not eat enough on a traditional western diet since there are a lot of carbohydrates, protein, or fat and most of the micronutrients take care of themselves without obsessing. I experienced two outlier situations that required extra attention several years ago. The first was having to commute 5 miles or more by walking, longboarding, or using public transportation, requiring additional calorie intake. During a separate period I was also a vegetarian which requires more planning to eat enough protein and B12 vitamins. The main issue in my diet is a lack of fiber and not eating voluminous low calorie foods like vegetables and fruits.

## **Psychological Observations**



Attempting to combine skateboarding as a supplemental training exercise for a youth sport such as football or rugby would prove difficult because of the regularity of the organized schedule. Muscles in the lateral leg compartment become overdeveloped while skateboarding and more established plyometric exercises such as box jumps, ladders, and sled pulls more evenly build coordination. Fatigue probably increases the risk of concussions since lack of energy decreases awareness while playing sports and is incidentally supported by my own experience trying to both play a sport and perform academic research. The easy accumulation of severe bruises and sprains performing even basic tricks could be debilitating for youth sports where time missed is perceptively longer. Almost everyone's organized competitive athletic career ends after high school graduation and future nostalgia for the last few years is more important for an individual's psyche than tangible wins or faster marks.

Another issue with skateboarding is newly unemployed middle aged people taking skateboarding very seriously to recapture the youthful glory of participating in school sports. I suspect this is what happened at the turn of the millenium when effective marketing sold what is effectively difficult rollerblading as a weight loss strategy to curb rising U.S. obesity. Delusions of grandeur were directed to hypercompetitive masculine stereotypes and resulted in superiority contests to see who could jump off the highest stair resulting in severely mangled limbs. Hometown heros could also motivate people within the group to exercise until severe muscular damage occurred and \$100 skinny jeans were worn once before becoming torn. By 2020 it became apparent that skateboarders are the worst demographic to market toward because they are loners that have no money. It is an effective exercise for the 20-50 demographic that moves between cities for work because the sport doesn't require extra equipment or people and carries

over several skills from organized sports, besides occupying the long stretches of boredom by reading or rehabilitating imbalanced muscular pain during inclement weather.

Within the context of skating's history, these physiological conclusions would take significantly longer to find before the internet and even longer before computerized library catalogs with some texts being outdated or graffitied. Having to physically transport yourself several miles to the library or hospital to ask a doctor without insurance would make this sport inaccessible for most people. One scenario would be delusions of grandeur by those who are otherwise academically unremarkable as newly energized athletes, leading to inflamed sense of ability. The satisfaction from efficiently solving math problems becomes addictive for young people after being told they were mediocre for decades and skateboarding's loose affiliation with late 20th century anti-establishment ideas might lead to cheating to gain entrance into higher academic institutions. The participant would have to be under regular observation by guardians or medical personnel to avoid catastrophic martyrdom.

## **Results**

<todo introduction paragraph>

The tables ran from July 22nd until October 29th for a total of 100 days and data analysis includes graphical displays of each exercise duration or distance, and compares observations with human predictions and model predictions. Nutrition values are examined with weather and several relationships between moving mean and moving Pearson or Spearman correlation.

### *Exercise Schedule*

<Time Series Duration Graph>

0.) Skateboarding

1.) Longboarding Distance

2.) Downhill Longboarding

3.) Juggling

4.) Running Distance

### *Pain Chart*

<Time Series Graph>

0.) Observation

1.) Manual Prediction

2.) ARIMA Model Performance?

Exercise intensity from the middle of September until October indicated improved pacing since there were only two days where pain became abnormally debilitating.

### *Nutrition*

<Time Series Graph>

0.) Calories

1.) Salt, Fat, Protein, Carbohydrate, Alcohol

2.) Humidity and Temperature Summary

3.) Humidity and Temperature Ground Observations

4.) Exercise Intensity Summary

### *Comparisons*

0.) [seasonal?] AutoRegressive Integrated Moving Correlation ([s]ARIMC) or Pearson's Correlation: Exercise duration and \_\_\_\_

A.) Calorie Intake

B.) Real Temperature and Humidity (would have to download)

C.) Alcohol servings? Usually it was beer but at least once I had vodka, is that a real world observation

1.) (s)ARIMA Spearman's Rank or similar non-parametric comparison \_\_\_\_

A.) Category duration and (pain, calories burned)

B.) Category duration and nutrient (salt, fat, protein, carbohydrates)

C.) Real weather and summary weather ([Temperature Degrees or Humidity] vs [humidity {dry or wet} or temperature {cold, moderate, hot}])

D.) Pain and real weather

E.) Pain and summary weather

F.) D. and E.

*Data Filling*

**I'm not sure if predictions should be an entire chapter or avoided like the plague:**

(s)ARIMA, neural nets, etc.? between chapter 11 and 13 June and July no data values.

Validate with a subset of data from chapter 13 or 11. The accuracy is not going to be good since there isn't enough data or the GPU accelerator would decrease accuracy -> this part might not even be included.

Right lower back pain on the quadratus hip attachment occurred during heavy weighted and forward leaning powerlifting back squats that relied on the stronger right gluteal muscles to complete the lift. This theory is supported by performing back squats with slight weight shift onto the left leg and forward to use the gluteal and hamstring muscles, resulting in identical muscular soreness on the inelastic quadratus at the hip attachment. Post squat soreness is also apparent in the soleus muscle of the right calf.

Running constricted the peroneus longus and anterior tibialis but did not become overused to the point of shin splints. Strengthening the right gluteus medius through lateral leg raises prior to skateboarding reduced lower back and hip strain but forced more pressure onto the vastus lateralis while resuming exercise. The lateral knee attachment raises the patellar when the moderately sized tensor fasciae latae (TFL), gluteus medius, and vastus lateralis from the quadriceps are inflamed from overuse. The iliotibial (IT) band is an inflexible framework for the previously listed lateral upper muscles and assists in pulling the knee laterally when the TFL and lateral quadriceps increase in volume to use fibroblasts to repair torn myocytes. This results in the characteristic IT band snap which is the IT snapping over the lateral epicondyle on the distal section of the femur. Similar snapping was eventually observed with the vastus intermedius and rectus femoris around the patellar.

## Conclusions

<todo>

## References

### *Kinematic functions of skateboarding*

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1. Comparison of muscular strength and imbalance in powerlifters and jumpers

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2. Knee side-to-side strength asymmetry and hamstring-to-quadriceps strength ratios in professional street skateboarding athletes

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3. An evaluation of agonist:antagonist strength ratios and posture among powerlifters

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4. Clinical characteristics of peroneal nerve palsy by posture

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5. Peroneal Nerve Injury

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6. Alteration of quadriceps muscle activity during functional step tasks after extended sitting session

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7. Kinematic analysis of knee valgus during drop vertical jump and forward step-up in young basketball players

### *Inflammation*

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8. The immunomodulation and anti-inflammatory effects of garlic organosulfur compounds in cancer chemoprevention

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15. Repeated activation of C1 neurons in medulla oblongata decreases anti-inflammatory effect via the hypofunction of the adrenal gland adrenergic response

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16. Fibroblasts as novel therapeutic targets in chronic inflammation

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17. Structural biology of the IL-1 superfamily: Key cytokines in the regulation of immune and inflammatory responses

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18. High dietary salt intake activates inflammatory cascades via Th17 immune cells: impact on health and diseases

*Injuries*

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19. Peroneal Tendon Syndromes <https://www.ncbi.nlm.nih.gov/sites/books/NBK544354/>