High School Marks of All-American's in Division III Track & Field

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Abstract—The nature of this project was to build a database and analyze the High School marks of the All-American's in NCAA Division III Track & Field dating back to 2016. Data was researched to learn what High School Track & Field marks have a good chance of becoming All-American's in Division III in the future. The Head Coach of Track & Field at the University of Wisconsin-River Falls (UWRF) helped create the guidelines of this project.

Index Terms—Data, Databases, Statistical Databases, Database Design, Database Management.

1 Introduction

THIS project was created to be an important recruiting tool for the UWRF Track and Field team to find High School Track and Field athletes that can compete at a high NCAA Division III level. In NCAA Division III there are no athletic scholarships to entice athletes, as only Division I and Division II athletic scholarships are allowed. For Division III level, merely recruiting the top High School track athletes in the state, region, or nation is not feasible. The top athletes go to colleges with newer facilities, experienced coaches, more funding for the team, better competition, more spotlight, better NIL deals (Name, Image, Likeness), and more. This project focused on how to find the best high school track and field athletes that would possibly compete at the Division III level to better recruit for the UWRF Track and Field team. To achieve this goal, finding high school times and marks of past Division III All-American's gave insight into what current high school times and marks are at the level to be future All-American's in Division III Track and Field. All-American's consist of the top eight finishers at the NCAA Track & Field championships, each division has their own championship meet.

The internet is full of databases of all sorts, but a database with high school times and marks of past All-American's in Division III Track and Field was not found. A database was therefore created based off the high school times of athletes who went All-American in Division III since 2016. The program R was utilized to analyze the dataset after it was created and organized in excel.

2 Procedure for Collecting Data

2.1 Guidelines of Data

Datasets contain specific information and are commonly used for analysis. In this project the head coach of UWRF's Track and Field team, Andrew Eggerth, helped to give what information would be needed for this project as well as the parameters to be analyzed. It was decided that the name of the All-American, the year they were an All-American, the event they were All-American in, their college personal best (PR) in the specific event, the state the All-American is from, the high school they went to, their high school PR in the specific event, and the high school second best in the specific event would be sufficient data. It is important to note there are also columns for the high school best and second best in feet for those that do not use the metric system. Additionally, not all events in the Division III Outdoor Track and Field championship are not everywhere in the United States. For example, Javelin is an event in college that is competed in few US states at high school level and was decided to not include those All-American's in this project. Additionally, there are some events that cannot be compared at an individual level, such as relays. This excludes the 4x100 meter relay and 4x400 meter relay from this project. There are also events that are different from college to high school, but it was decided other high school events could be compared to such college events. For college Hammer Throw the high school Discus Throw will be compared, for college 400-meter Hurdles the high school 300-meter Hurdles, and for college 5,000-meter, 10,000-meter, and 3,000-meter Steeplechase the high school 3,200 meter.

2.2 Finding All-Americans

To find Outdoor Track and Field championships in Division III dating back to 2016 the website TFRRS was used, except the year 2020 as the outdoor season was cancelled due to COVID-19. TFRRS gives the results of the Outdoor Championships by event and lists the athletes in order of finish. The listed top eight finishers for each event are considered All-Americans, except for certain circumstances where there are ties in the field events which result in more than eight athletes finishing in the top eight. All these athletes are All-Americans and were added to the project. By clicking on each name of the All-Americans the website redirects to their biography page

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that lists the PR of all the events they did in college. These college PRs were then inputted into the database. The biography also included the name of the college or university the All-American attends or previously attended. All the above information helped contribute to finding the All-American's high school information.

2.3 Finding High School Information

The websites found that have the high school information required for this project are Mile Split, Athletic.net, and Maxpreps. Athetic.net was chosen because it did not require a fee to obtain the necessary information. Athletic.net is simple to use but it was difficult at times to find the correct person's high school information. The names of the All-Americans were sometimes common and finding the correct profile on Athletic.net, without knowing the high school they attended lead to uncertainty. To improve accuracy and confidence of using the correct data, the method used to find the high school and state the All-American is from included looking up their biography on their college rosters. TFRRS had the name of the college the All-American attended, making it feasible to look on the internet for the roster and bio of the All-Americans. The college bios would also detail the high school and hometown of the athlete, which would make it easier to match the correct profile on Athletic.net. However, this method did not work with every athlete since their full name or nick name might be used on Athletic.net, resulting in their profile not showing up when searched. Since the high school's name could be found through a college bio, the high school could be searched in Athletic.net. Athletic.net also features a list of past athletes that competed for the same high school, and by clicking on the name of the of the athlete needed the site will go directly to the athlete's profile. However, not all high school profiles were found on Athletic.net, as some All-Americans were from other countries, where it is rare for them to be on Athletic.net. There were two All-Americans where no information on where they were from or what high school they attended were found, their names are Sam Anderson, Women's Discus Throw and Josh Thorson, Men's 5,000 meter.

2.4 Finding High School Information for Multis

The information for Decathalon and Heptathlon All-Americans are different from each other and from the rest of the All-American dataset therefore separate datasets were created for them. Decathalon men compete in ten events; not all these ten events are able to be compared to high school marks, such as Javelin, but 100-meter, 400-meter, 110-meter Hurdles, 1,500-meter, High Jump, Long Jump, Pole Vault, Shot Put, and Discus are compared in this project. The Heptathlon has seven events with Javelin being the only event not able to be compared to high school marks, but 200-meter, 800-meter, 100-meter Hurdles, High Jump, Long Jump, and Shot Put are compared in this project. The process of finding the information is the same as other All-Americans by using Athetic.net. The database for the Decathalon will contain the high school PR marks of the events listed above minus Javelin and will also contain college PR marks for those same events, the state they are from, the high school they are from, and their PR Decathalon score. The database for the Heptathlon will contain the same as the Decathlon, with the events being slightly different, as they are listed above.

3 Structuring the Data

The Database for the All-Americans cover a vast amount of information and consequently needs to be structured in a way that can be used properly in R. While collecting the data each event was given its own excel sheet, 100-meter men, 100-meter women and so on. If left this way there would be many small datasets, making it hard for a user to compare more than one event at a time. The process that was used to combine all the excel sheets into one single excel sheet was to make a column that listed the event, for example "M 100m" standing for Men's 100-meter, making it clear what event each All-American was a part of. Columns were added for the marks to be in feet for the field events, columns for high school PR in feet and high school second-best in feet were also created, since high school marks are generally listed in feet and inches. The field event marks were converted into meters and added the columns of high school best and high school second best accordingly, to be able to compare to the college PR and to also keep the "HS_Best" and "HS_2nd_Best" columns as decimal format. The next step was to change all the high school times to be the same, such as converting 1,500-meter times or 1 Mile times to 1,600-meter times and 3,000-meter times or 2 Mile times to 3,200-meter times. The Running Conversion Calculator on the website Mile Split was used to convert the high school times and the college PR times of 1,500-meter. The high school times of the 400-meter Hurdles were converted by multiplying the high school time by 0.75 to convert it to 300-meter Hurdle times, as there was no knowledge found on how to calculate the times another way. The "HS_Best", "HS_2nd_Best", and "College_PR" columns would only work in R if all the information in said column was in decimal form, meaning that times that were over one minute needed to be converted into seconds. Decimal format will allow the R programming to work, since the columns are all one type. Then the final step was to combine the data into one excel sheet to make one unified database. The same steps were also taken for the Decathlon and Heptathlon datasets to keep the same structure throughout all three datasets.

4 Analyzing the Datasets

4.1 Datasets

The Decathlon and Heptathlon datasets have similar criterion analyzed, such as to figure out what type of high schoolers would have a potential to be good multis in college. The All-American dataset analyzes a larger variety of events in several different ways. All datasets were looked at to see the states that had the most All-Americans to learn where the best areas are for recruiting. Areas specifically investigated within all datasets were the average improvement from high school to college, and the average of high school times per event.

4.2 The States All-American's are From

After analyzing all the datasets there was a state that was on top for all three datasets, this state was Wisconsin. The top three states in the Decathlon were Wisconsin with 11, New York with 4, and California, Minnesota, Ohio, Oregon, and Virginia all tied with 3 All-Americans (Figure 1). Wisconsin clearly dominates the Decathlon, more than doubling New York the second highest and more than tripling every other state.

Wisconsin	New York	California	Minnesota	Ohio	Oregon	Virginia
11	4	3	3	3	3	3
Illinois	Iowa	Connecticut	Idaho	Massachusetts	Missouri	Sweden
2	2	1	1	1	1	1
Washington						
1						

Fig. 1. Number of Decathlon All-Americans from each state.

The top three states in the Heptathlon were Wisconsin with 9, New York with 8, and California with 5 All-American's. Both Heptathlon and Decathlon had similar results with Wisconsin, New York, and California in the top three states for both.

Wisconsin	New York	California	New Jersey	Iowa	Michigan	Washington	Connecticut
9	8	5	3	2	2	2	1
Illinois	Indiana	Minnesota	Missouri	North Dakota	Ohio	Oregon	Pennsylvania
1	1	1	1	1	1	1	1

Fig. 2. Number of Decathlon All-Americans from each state.

The All-American dataset has a larger sample size with All-American's that are from outside of the United States, such as England, Israel, Germany, Sweden, Bahamas, Belgium, Canada, Jamacia, Ghana, Japan, Nigeria, and Saudi Arabia. The top three states in the All-American dataset were Wisconsin with 187, Illinois 180, and New York with 109. Wisconsin and Illinois are the top states to recruit from, but there are other states that just missed the top three as you can see below in Figure 3.

Wisconsin	Illinois	New York	Ohio	Minnesota
187	180	109	105	82
Massachusetts	New Jersey	Pennsylvania	Iowa	California
78	78	65	52	40
Oregon	Virginia	Washington	Texas	Maryland
36	32	31	26	25
Missouri	Connecticut	Indiana	Maine	Nebraska
24	21	20	20	20
Michigan	Florida	Colorado	Delaware	Georgia
17	16	9	8	8
Kentucky	New Hampshire	North Carolina	Rhode Island	District of Columbia
6	6	6	6	5
Tennessee	Arkansas	England	Idaho	Israel
4	3	3	3	3
Montana	Nevada	Bahamas	Canada	Delware
3	3	2	2	2
Japan	Kansas	Louisiana	North Dakota	Virgina
2	2	2	2	2
Belgium	Germany	Ghana	Hawaii	Jamacia
1	1	1	1	1
Mississippi	New Mexico	Nigeria	Saudi Arabia	South Carolina
1	1	1	1	1
Sweden				
1				

Fig. 3. Number of All-American's from each state or country, note that two All-American's are missing from this figure due to no information found on what state they are from.

As seen from Figures 1, 2, and 3 that Wisconsin is the top state to recruit from for Division III Track and Field, but Illinois was not far behind. The New England region also has a strong area of All-American's, with New York, Massachusetts, New Jersey, and Pennsylvania, having sixty-five or more All-American's in each of those states. Wisconsin and New York finished first and second in that order for both the Decathalon and Heptathlon All-American's, although Wisconsin had sizeable amount more for the Decathalon. The strongest areas to recruit from for All-American's in Division III Track and Field would be the western Great Lakes region; Wisconsin, Illinois, and Minnesota; also, the New England region; New York, Massachusetts, New Jersey, Pennsylvania, Maryland, and Connecticut.

4.3 All-American's High School Times by Event

Finding high school times and marks may have been time consuming and challenging at times but was a vital process to learning what high school times and marks are considered good in college at the Division III level. Section 4.3 will break down by event what high school times and marks of the event are desirable based off the times and marks of All-American's. The All-American's high school best and second best will be used, as the high school best may be an outlier to the rest of the high schooler's performance. The breakdown of this analysis shows histograms as a visual way to see where outliers may be and to see where an average of the All-American's performed in high school. The frequency in the histograms show how many athletes fall within a given range. The given numerical summary helps summarize the data the historgram is showing.

4.3.1 Men's 100 Meters

As seen in Figure 4, the bulk of the 100-meter times from high school by All-American's range from 10.6 seconds to 11.4 seconds, with a small amount faster than 10.6 seconds and a small amount of times being slower than 11.4 seconds.

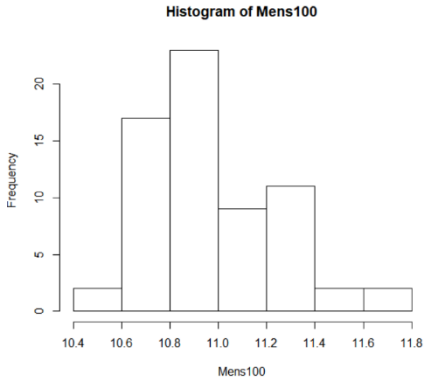

Fig. 4. Histogram of Men's 100-meter All-American's times from high school.

In Figure 5 the numbers tell a similar story to Figure 4. It shows the top twenty-five percent of the men's All-American 100-meter in high school are faster or equal to 10.8 seconds, and that the bottom twenty-five percent of the men's All-American 100-meter in high school times are equal to or slower than 11.15 seconds, with the middle fifty percent of the high school times falling in between 10.8 seconds and 11.15 seconds. The average high school time of the men's 100-meter was found to be 10.97 seconds, the fastest time was 10.50 seconds and the slowest was 11.76 seconds. There are twelve high school times for the men's 100-meter that were not found due to the All-American's best high school time or second best not being available.

```
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
 10.50   10.80   10.90   10.97   11.15   11.76      12
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Fig. 5. Summary of Men's 100-meter All-American's times from high school.

4.3.2 Women's 100 Meters

As seen in Figure 6 that the 100-meter times from high school by All-American's range from 12 seconds to 13 seconds, with not many outliers.

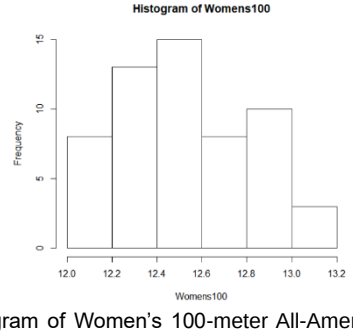

Fig. 6. Histogram of Women's 100-meter All-American's times from high school.

Figure 7 is data from the Women's 100-meter All-American times and shows the first quarter starting at 12.34 seconds and the third quarter at 12.78 seconds. The average high school time of the women's 100-meter is 12.52 seconds, the fastest time being 12.03 seconds and the slowest being 13.17 seconds. There are twenty-three high school times for the women's 100-meter that were not found, either due to the All-American's best high school time and/or second best not being found.

```
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
 12.03   12.34   12.44   12.52   12.78   13.17      23
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Fig. 7. Summary of Women's 100-meter All-American's times from high school.

4.3.3 Men's 200 Meters

As seen in Figure 8, shown below, the bulk of the 200-meter times from high school by All-American's range from 21.5 seconds to 23.5 seconds, with a small group being faster than 21.5 seconds.

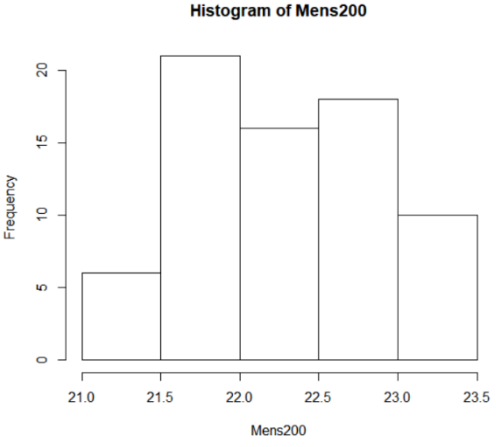

Fig. 8. Histogram of Men's 200-meter All-American's times from high school.

In Figure 9 the numbers depict a summary of Men's 200-meter times with the first quarter starting at 21.86 seconds and the third quarter at 22.73 seconds. The average high school time of the men's 200-meter is 22.27 seconds, the fastest time being 21.2 seconds and slowest being 23.47 seconds. There are nine high school times for the men's 200-meter that were not found, either being due to the All-American's best high school time and/or second best also not being found.

```
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
 21.20   21.86   22.11   22.27   22.73   23.47       9
```

Fig. 9. Summary of Men's 200-meter All-American's times from high school.

4.3.4 Women's 200 Meters

As seen in Figure 10 the bulk of 200-meter times ran in high school by All-American's range from 25 seconds to 26 seconds, with many outliers slower than 26 seconds and a small amount faster than 25 seconds.

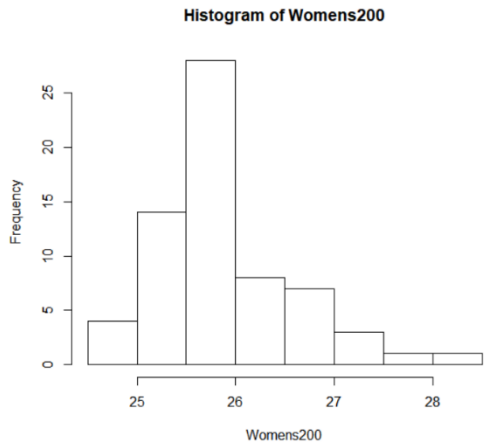

Fig. 10. Histogram of Women's 200-meter All-American's times from high school.

In Figure 11 the numbers tell a similar story as the Men's 200-meter with the first quarter starting at 25.46 seconds and the third quarter at 26.18 seconds. The average high school time of the women's 200-meter is 25.92 seconds, with the fastest time recorded as 24.84 seconds and the slowest being 28.40 seconds. There are fourteen high school times for the women's 200-meter that were not found, either due to the All-American's best high school time and/or second best not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  24.84   25.46   25.77   25.92   26.18   28.40      14
```

Fig. 11. Summary of Women's 200-meter All-American's times from high school.

4.3.5 Men's 400 Meters

As seen in Figure 12, a majority of the 400-meter times from high school by All-American's range from 48 seconds to 51 seconds, with a small group being faster than 48 seconds and different small groups slower than 51 seconds.

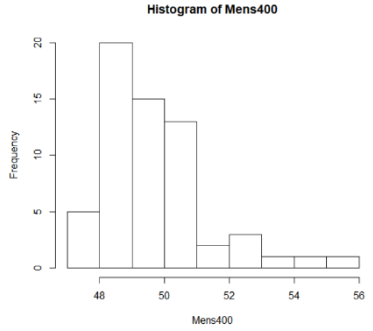

Fig. 12. Histogram of Men's 400-meter All-American's times from high school.

In Figure 13 the numbers show the first quarter starting at 48.23 seconds and the third quarter at 50.08 seconds. The average high school time of the men's 400-meter is 49.58 seconds, the fastest time being 47.53 seconds and the slowest being 55.14 seconds. There are nineteen high school times for the men's 400-meter that were not found, either being due to the All-American's best high school time and/or second best also not being found.

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   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  47.53   48.23   49.33   49.58   50.08   55.14      19
```

Fig. 13. Summary of Men's 400-meter All-American's times from high school.

4.3.6 Women's 400 Meters

As seen in Figure 14 there is an increase of the 400-meter times from high school by All-American's that range from 55 seconds to 59 seconds, where it peaks, with many outliers slower than 59 seconds.

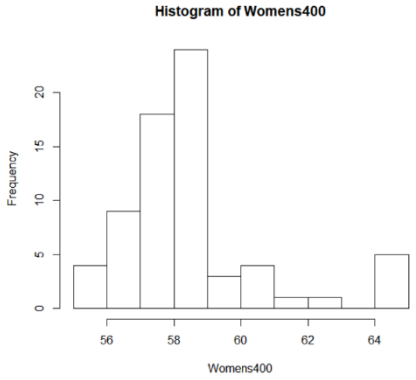

Fig. 14. Histogram of Women's 400-meter All-American's times from high school.

Figure 15 shows the first quarter starting at 57.32 seconds and the third quarter at 58.88 seconds. The average high school time of the women's 400-meter can be seen as 58.47 seconds, the fastest time being 55.6 seconds and the slowest being 64.8 seconds or 1:04.8 minutes. There are eleven high school times for the women's 400-meter that were not found, either due to the All-American's best high school time and/or second best not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  55.60   57.32   58.11   58.47   58.88   64.80      11
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Fig. 15. Summary of Women's 400-meter All-American's times from high school.

4.3.7 Men's 800 Meters

As seen in Figure 16 most of the 800-meter times from high school by All-American's range from 110 seconds to 125 seconds, with a hand full of times slower than 125 seconds.

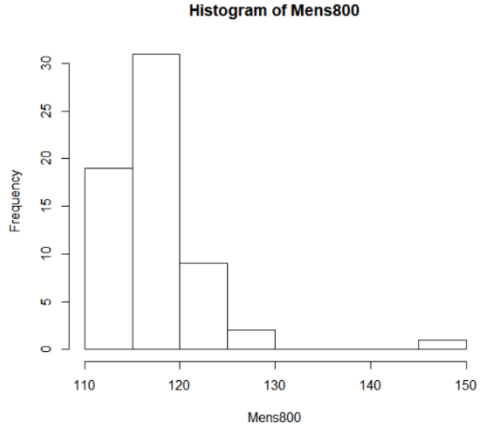

Fig. 16. Histogram of Men's 800-meter All-American's times from high school.

In Figure 17, the Men's 800-meter times, the first quarter starts at 1:54.8 minutes, and the third quarter starts at 1:59.1 minutes. The average high school time of the men's 800-meter is 1:57.6 minutes, the fastest time 1:51.9 minutes and the slowest 2:25.9 minutes. There are eighteen high school times for the men's 800-meter that were not found, either due to the All-American's best high school time and/or second best not being found.

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   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  111.9   114.8   116.5   117.6   119.1   145.9      18
```

Fig. 17. Summary of Men's 800-meter All-American's times from high school.

4.3.8 Women's 800 Meters

As seen in Figure 18 that most of the 800-meter times from high school by All-American's range from 135 seconds to 140 seconds, and small amounts slower and faster than that range.

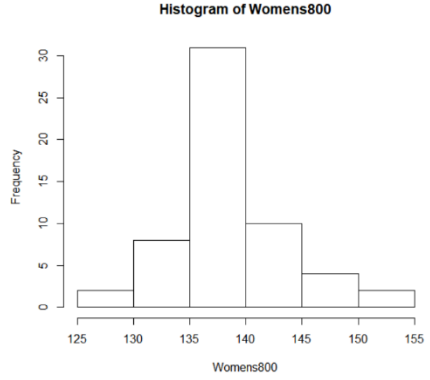

Fig. 18. Histogram of Women's 800-meter All-American's times from high school.

In Figure 19 it can be seen that the first quarter starts at 2:15.9 minutes and the third quarter at 2:20.4 minutes. The average high school time of the women's 800-meter was found to be 2:19 minutes, the fastest at 2:09.7 minutes and the slowest at 2:34.5. There are twenty-three high school times for the women's 800-meter that were not found, either due to the All-American's best high school time and/or second best not being found.

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   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  129.7   135.9   138.8   139.0   140.4   154.5      23
```

Fig. 19. Summary of Women's 800-meter All-American's times from high school.

4.3.9 Men's 1,500 Meters

As seen in Figure 20 that the bulk of 1,600-meter times from high school by All-American's range from 255 seconds to 265 seconds, with different small groups slower than 265 seconds and a small amount faster than 265 seconds. The high school times have all been converted to 1,600-meter, as the 1,600-meter is the common comparison to the 1,500-meter in college.

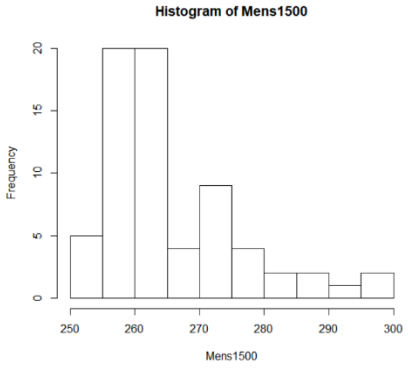

Fig. 20. Histogram of Men's 1,600-meter All-American's times from high school.

In Figure 21 the first quarter starts at 4:18.8 minutes, and the third quarter at 4:31.8 minutes. The average high school time of the men's 1,600-meter being 4:25.7 minutes, the fastest time being 4:12.0 minutes and the slowest being 4:58.4 minutes. There are eleven high school times for the men's 1,600-meter that were not found, either due to the All-American's best high school time and/or second best not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  252.0   258.8   262.8   265.7   271.8   298.4      11
```

Fig. 21. Summary of Men's 1,600-meter All-American's times from high school.

4.3.10 Women's 1,500 Meters

As seen in Figure 22 there is a spike of the 1,600-meter times from high school by All-American's 300 seconds to 310 seconds, with gradual decrease slower than 310 seconds and a hand full of high schoolers faster than 300 seconds. The high school times have all been converted to 1,600-meter, as the 1,600-meter is the common comparison to the 1,500-meter in college.

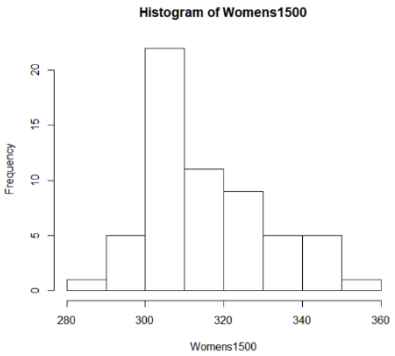

Fig. 22. Histogram of Women's 1,600-meter All-American's times from high school.

In Figure 23 the data has the first quarter starting at 5:04.0 minutes and the third quarter at 5:25.2 minutes. The average high school time of the women's 1,600-meter can be seen as 5:15.8 minutes, the fastest time being 4:47.6 minutes and the slowest being 5:58.1 minutes. There are twenty-one high school times for the women's 1,600-meter that were not found, either due to the All-American's best high school time and/or second best not

being found.

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   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
   287.6   304.7   310.5   315.8   325.2   358.1      21
```

Fig. 23. Summary of Women's 1,600-meter All-American's times from high school.

4.3.11 Men's 5,000 Meters

As seen in Figure 24 majority of the 3,200-meter times from high school by All-American's range from 540 seconds to 580 seconds, with different small groups slower than 580 seconds. The high school times have all been converted to 3,200-meter, as the 3,200-meter is the closest comparison to the 5,000-meter in college.

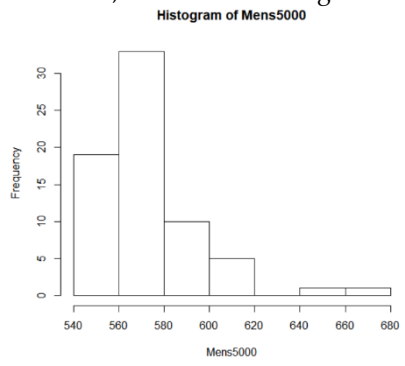


Fig. 24. Histogram of Men's 5,000-meter All-American's, 3,200-meter times from high school.

In Figure 25 the first quarter starts at 9:18.5 minutes, and the third at 9:39.7 minutes. The average high school time of the men's 3,200-meter is 9:31.7 minutes, the fastest time at 9:07.1 minutes and the slowest at 11:00.4 minutes. There are eleven high school times for the men's 3,200-meter that were not found, either due to the All-American's best high school time and/or second best not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
   547.1   558.5   564.5   571.2   579.7   660.4      11
```

Fig. 25. Summary of Men's 5,000-meter All-American's, 3,200-meter times from high school.

4.3.12 Women's 5,000 Meters

As seen in Figure 26 there is a wide variety of the 3,200-meter times from high school by All-American's from 640 seconds to 760 seconds, with one time faster than the rest. The high school times have all been converted to 3,200-meter, as the 3,200-meter is the closest comparison to the 5,000-meter in college.

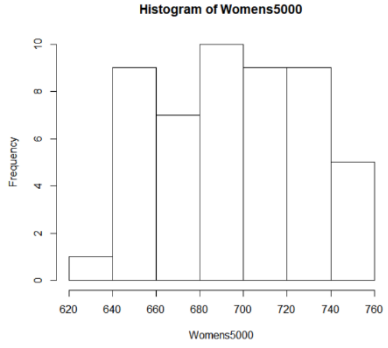


Fig. 26. Histogram of Women's 5,000-meter All-American's, 3,200-meter times from high school.

In Figure 27 the numbers show a similar pattern with the first quarter starting at 11:08.5 minutes and the third quarter at 12:08.2 minutes. The average high school time of the women's 3,200-meter can be seen as 11:36.2 minutes, the fastest time being 10:28.3 minutes and slowest being 12:37.4. There are thirty high school times for the women's 3,200-meter that were not found, either due to the All-American's best high school time and/or second best not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
   628.3   668.5   698.8   696.2   728.8   757.4      30
```

Fig. 27. Summary of Women's 5,000-meter All-American's, 3,200-meter times from high school.

4.3.13 Men's 10,000 Meters

As seen in Figure 28 many of the 3,200-meter times from high school by All-American's range from 560 seconds to 580 seconds, with different small groups slower than 580 seconds and a group faster than the range. The high school times have all been converted to 3,200-meter, as the 3,200-meter is the closest comparison to the 10,000-meter in college.

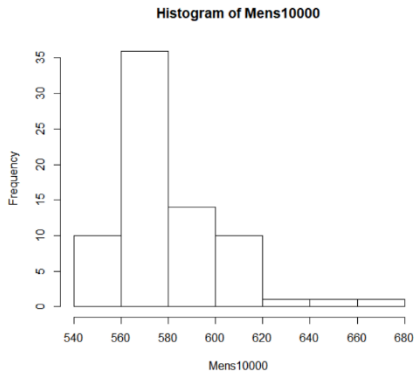


Fig. 28. Histogram of Men's 10,000-meter All-American's, 3,200-meter times from high school.

In Figure 29 the numbers show the first quarter starting at 9:22 minutes, and the third at 9:45.5 minutes. The average high school time of the men's 3,200-meter is 9:38.5 minutes, the fastest time at 9:07.6 minutes and slowest at 11:00.4 minutes. There are seven high school times for the men's 3200-meter that were not found, either due to the All-American's best high school time and/or second best not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
   547.6   562.0   574.0   578.5   585.5   660.4       7
```

Fig. 29. Summary of Men's 10,000-meter All-American's, 3,200-meter times from high school.

4.3.14 Women's 10,000 Meters

As seen in Figure 30 there is a rise and fall of the 3,200-meter times from high school by All-Americans looking approximately like a bell curve. The high school times have all been converted to 3,200-meter, as the 3,200-meter is the closest comparison to the 10,000-meter in college.

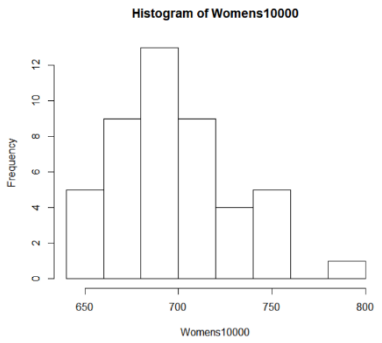


Fig. 30. Histogram of Women's 10,000-meter All-American's, 3,200-meter times from high school.

In Figure 31 the first quarter starts at 11:14.6 minutes and the third quarter at 11:54.4 minutes. The average high school time of the women's 3,200-meter is 11:37.3 minutes, the fastest time being 10:40.0 minutes and slowest being 13:06.8 minutes. There are thirty-four high school times for the women's 3,200-meter that were not found, either due to the All-American's best high school time and/or second best not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  640.0   674.6   691.8   697.3   714.4   786.8      34
```

Fig. 31. Summary of Women's 10,000-meter All-American's, 3,200-meter times from high school.

4.3.15 Men's 110 Meter Hurdles

As seen in Figure 32 many of the 110-meter hurdles times from high school by All-American's range from 14 seconds to 16 seconds, with a few times slower than 16 seconds.

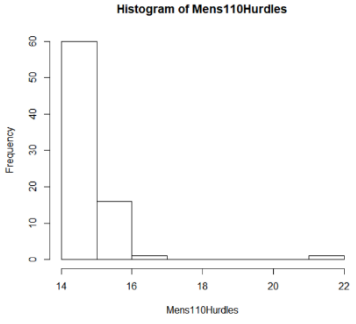


Fig. 32. Histogram of Men's 110-meter hurdles All-American's times from high school.

Figure 33 has the first quarter starting at 14.51 seconds, and the third at 14.95 seconds. The average high school time of the men's 110-meter hurdles calculates to 14.87 seconds, the fastest time being 14.23 seconds and slowest at21.28 seconds. There are two high school times for the men's 110-meter hurdles that were not found, either due to the All-American's best high school time and/or second best not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  14.23   14.51   14.68   14.87   14.95   21.28       2
```

Fig. 33. Summary of Men's 110-meter hurdles All-American's times from high school.

4.3.16 Women's 100 Meter Hurdles

As seen in Figure 34 many of the 100-meter hurdles times from high school by All-American's goes from 14.5 seconds to 16 seconds, with one time faster than the rest and smaller amounts slower than 16 seconds.

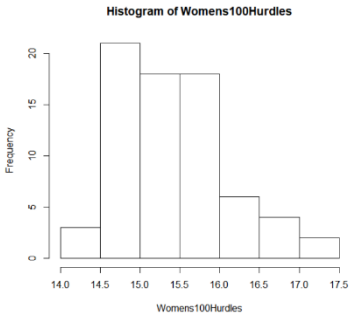


Fig. 34. Histogram of Women's 100-meter hurdles All-American's times from high school.

Figure 35 shows the numbers of the first quarter starting at 14.91 seconds and the third quarter at 15.78 seconds. The average high school time of the women's 100-meter hurdles being 15.42 seconds, and the fastest time being 14.42 seconds and the slowest being 17.40 seconds. There are eight high school times for the women's 100-meter hurdles that were not found, either due to the All-American's best high school time and/or second best not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  14.42   14.91   15.29   15.42   15.78   17.40       8
```

Fig. 35. Summary of Women's 100-meter hurdles All-American's times from high school.

4.3.17 Men's 400 Meter Hurdles

As seen in Figure 36 many of the 300-meter hurdles times from high school by All-Americans range from 38 seconds to 44 seconds, with a few times slower than 44 seconds and a small group faster than 38 seconds. The high school times have all been converted to 300-meter hurdles, as the 300-meter hurdles is the common comparison to the 400-meter hurdles in college.

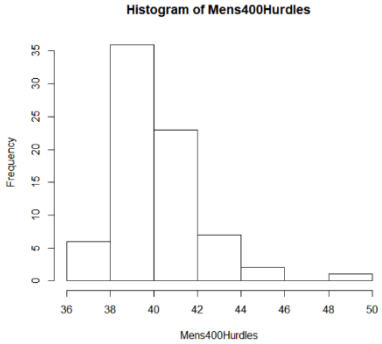


Fig. 36. Histogram of Men's 400-meter hurdles All-American's, 300-meter hurdle times from high school.

In Figure 37 the numbers agree with above, the first quarter starting at 38.94 seconds, and the third quarter at 41.19 seconds. The average high school time of the men's 300-meter hurdles is 40.15 seconds, the fastest time being

37.73 seconds and slowest being 49.70 seconds. There are five high school times for the men's 300-meter hurdles that were not found, either due to the All-American's best high school time and/or second best not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  37.73   38.94   39.82   40.15   41.19   49.70       5
```

Fig. 37. Summary of Men's 400-meter hurdles All-American's, 300-meter hurdle times from high school.

4.3.18 Women's 400 Meter Hurdles

As seen in Figure 38 there is a variety of the 300-meter hurdles times from high school by All-American's with the most from 46 seconds to 47 seconds. The high school times have all been converted to 300-meter hurdles, as the 300-meter hurdles is the common comparison to the 400-meter hurdles in college.

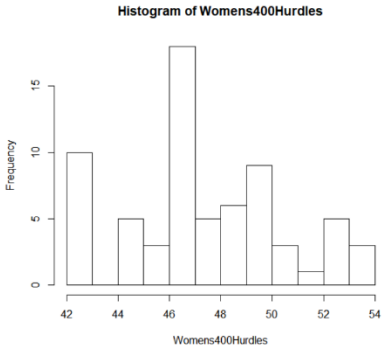


Fig. 38. Histogram of Women's 400-meter hurdles All-American's, 300-meter hurdles times from high school.

In Figure 39 the first quarter starts at 45.74 seconds and the third at 49.65 seconds. The average high school time of the women's 300-meter hurdles is 47.36 seconds, the fastest time being 42.54 seconds and the slowest being 53.20 seconds. There are twelve high school times for the women's 300-meter hurdles that were not found, either due to the All-American's best high school time and/or second best not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  42.54   45.74   46.82   47.36   49.65   53.20      12
```

Fig. 39. Summary of Women's 400-meter hurdles All-American's, 300-meter hurdle times from high school.

4.3.19 Men's 3,000 Meter Steeplechase

As seen in Figure 40 many of the 3,200-meter times from high school by All-American's range from 500 seconds to 610 seconds, with several times faster than 500 seconds and small groups slower than 610 seconds. The high school times have all been converted to 3,200-meter, as the 3,200-meter is the closest comparison to the 3,000-meter Steeplechase in college.

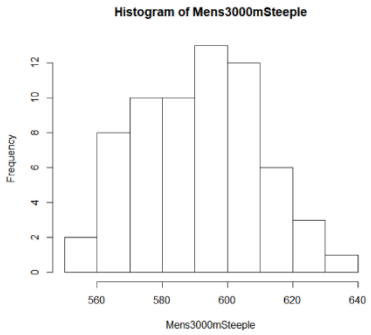


Fig. 40. Histogram of Men's 3,000-meter steeplechase All-American's, 3,200-meter times from high school.

In Figure 41 the numbers tell a similar story with the first quarter starting at 9:33.1 minutes, and the third quarter at 10:01.8 minutes. The average high school time of the men's 3,200-meter shows 9:50.6 minutes, the fastest time being 9:15.7 minutes and slowest at 10:34.9 minutes. There are fifteen high school times for the men's 3,200-meter that were not found, either due to the All-American's best high school time and/or second best not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  555.7   573.1   591.8   590.6   601.8   634.9      15
```

Fig. 41. Summary of Men's 3,000-meter steeplechase All-American's, 3,000-meter times from high school.

4.3.20 Women's 3,000 Meter Steeplechase

As seen in Figure 42 there is a large variety of the 3,200-meter times from high school by All-American's with the most from 650 seconds to 725 seconds. The high school times have all been converted to 3,200-meter, as the 3,200-meter is the closest comparison to the 3,300-meter steeplechase in college.

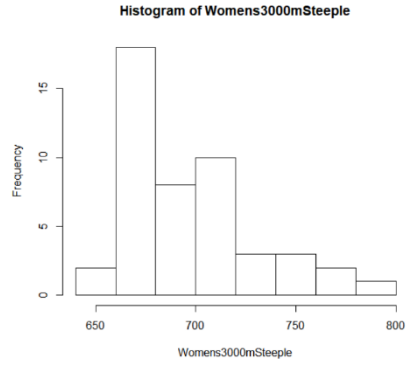


Fig. 42. Histogram of Women's 3,000-meter steeplechase All-American's, 3,200-meter times from high school.

In Figure 43 data shows the first quarter starting at 11:14.0 minutes and the third quarter at 11:51.5 minutes with the average high school time of the women's 3,200-meter being 11:37.2 minutes, the fastest time being 10:56.4 minutes, and the slowest being 13:13.0 minutes. There are thirty-three high school times for the women's 3,200-meter that were not found, either due to the All-American's best high school time and/or second best not being found.

```
 Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
656.4   674.0   692.3   697.2   711.5   793.0      33
```

Fig. 43. Summary of Women's 3,000-meter steeplechase All-American's, 3,200-meter times from high school.

4.3.21 Men's High Jump

As seen in Figure 44 many of the high jump marks from high school by All-American's range from 1.9 meters to 2 meters, with different groups higher and lower than the above range.

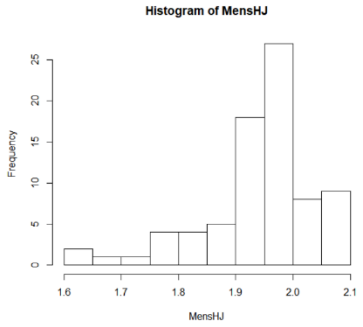


Fig. 44. Histogram of Men's High Jump All-American's marks from high school.

In Figure 45 the marks of the first quarter start at 1.905 meters or 6′3″, and the third quarter at 1.981 meters or 6′6″. The average high school mark of the men's high jump is 1.937 meters or 6′4.25″, with the highest mark being 2.089 meters or 6′10.25″ and lowest being 1.625 meters or 5′4″. There are seven high school marks for the men's high jump that were not found, either due to the All-American's best high school mark and/or second best not being found.

```
 Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
1.625   1.905   1.955   1.937   1.981   2.089       7
```

Fig. 45. Summary of Men's high jump All-American's marks from high school.

4.3.22 Women's High Jump

As seen in Figure 46 there is a large spread of high jump marks from high school by All-Americans with the biggest group around 1.65 meters.

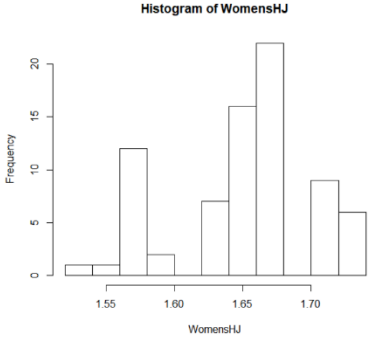


Fig. 46. Histogram of Women's high jump All-American's marks from high school.

In Figure 47 the numbers show with the first quarter starting at 1.625 meters or 5′4″ and the third quarter at 1.676 meters or 5′6″. The average high school mark of the women's high jump is 1.651 or 5′5″, the highest mark at 1.727 meters or 5′8″ and lowest at 1.524 meters or 5′0″. There are eight high school marks for the women's high jump that were not found, either due to the All-American's best high school mark and/or second best not being found.

```
 Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
1.524   1.625   1.651   1.651   1.676   1.727       8
```

Fig. 47. Summary of Women's high jump All-American's marks from high school.

4.3.23 Men's Long Jump

Shown in Figure 48 most of the long jump marks from high school by All-American's range from 6.5 meters and above.

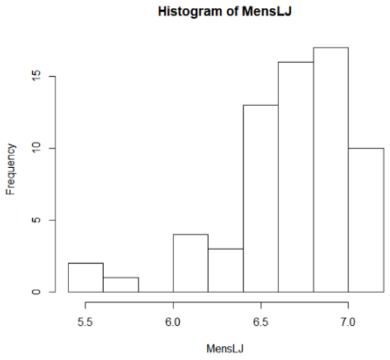


Fig. 48. Histogram of Men's Long Jump All-American's marks from high school.

In Figure 49 the numbers match with what is shown in Figure 48 with the first quarter starting at 6.480 meters or 21′3″, and the third quarter at 6.946 meters or 22′9.5″. The average high school mark of the men's long jump is 6.669 meters or 21′10.5″, the farthest mark is 7.131 meters or 23′4.75″ and the shortest being 5.454 meters or 17′10.75″. There are fourteen high school marks for the men's high jump that were not found, either due to the All-American's best high school mark and/or second best not being found.

```
 Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
5.454   6.480   6.711   6.669   6.946   7.131      14
```

Fig. 49. Summary of Men's long jump All-American's marks from high school.

4.3.24 Women's Long Jump

As seen in Figure 50 there is an interesting trend in the long jump marks from high school by All-American's. There is an increase of number of marks as the height increases, but slowly drops off around 5.5 meters.

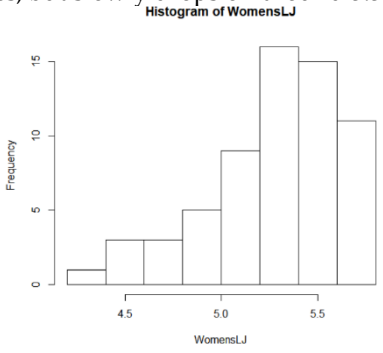


Fig. 50. Histogram of Women's long jump All-American's marks from

high school.

The numbers in Figure 51 tell the same story with the first quarter starting at 5.098 meters or 16′8.75″ and the third quarter at 5.498 meters or 18′0.5″. The average high school mark of the women's long jump is 5.280 meters or 17′3.75″, with the farthest mark being 5.727 meters or 18′9.5″ and shortest being 4.394 meters or 14′5″. There are seventeen high school marks for the women's long jump that were not found, either due to the All-American's best high school mark and/or second best not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  4.394   5.098   5.391   5.280   5.498   5.727      17
```

Fig. 51. Summary of Women's long jump All-American's marks from high school.

4.3.25 Men's Pole Vault

In Figure 52 shows there is spike of pole vault marks from high school by All-American's around 4.5 meters, with different groups higher and significantly lower than 4.5 meters.

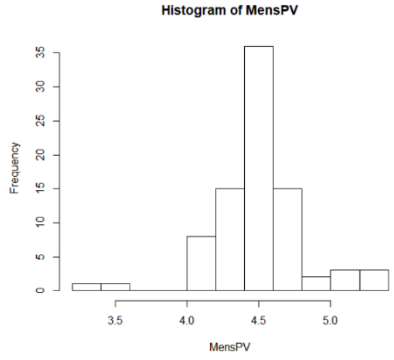


Fig. 52. Histogram of Men's Pole Vault All-American's marks from high school.

Figure 53 shows similar data with the first quarter starting at 4.343 meters or 14′3″, and the third quarter at 4.648 meters or 15′3″. The average high school mark of the men's pole vault is 4.487 meters or 14′8.5″, the highest mark being 5.260 meters or 17′3″ and the lowest being 3.352 meters or 11′0″.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  3.352   4.343   4.482   4.487   4.648   5.260
```

Fig. 53. Summary of Men's pole vault All-American's marks from high school.

4.3.26 Women's Pole Vault

A look at Figure 54 shows the pole vault marks from high school by All-American's trend up and down amount as the height increases but has big spikes from 3.3 meters to 3.7 meters.

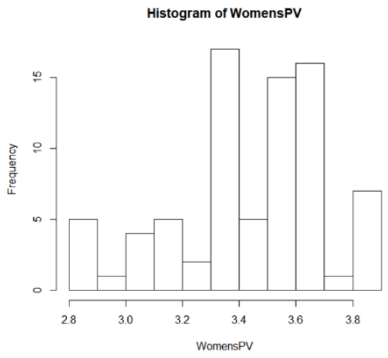


Fig. 54. Histogram of Women's pole vault All-American's marks from high school.

The numbers in Figure 55 have a big spread with the first quarter starting at 3.352 meters or 11′0″ and the third quarter at 3.651 meters or 11′11.75″. The average high school mark of the women's pole vault calculates as 3.444 meters or 11′3.5″, the highest mark being 3.863 meters or 12′8″ and lowest being 2.895 meters or 9′6″. There are eight high school marks for the women's pole vault that were not found, either due to the All-American's best high school mark and/or second best not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  2.895   3.352   3.502   3.444   3.651   3.863       8
```

Fig. 55. Summary of Women's pole vault All-American's marks from high school.

4.3.27 Men's Triple Jump

Shown in Figure 56 the triple jump marks from high school by All-American's has an approximate bell shape curve with a skew.

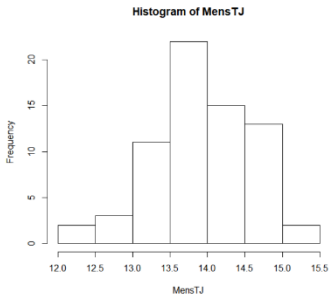


Fig. 56. Histogram of Men's Pole Vault All-American's marks from high school.

Figure 57 depicts similar numbers with the first quarter starting at 13.51 meters or 44′4″, and the third quarter at 14.39 meters or 47′2.5″. The average high school mark of the men's triple jump is 13.87 meters or 45′6″, the farthest mark being 15.16 meters or 49′9″ and the shortest being 12.03 meters or 39′5.5″. There are twelve high school marks for the men's triple jump that were not found, either due to the All-American's best high school mark and/or second best not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  12.03   13.51   13.86   13.87   14.39   15.16      12
```

Fig. 57. Summary of Men's triple jump All-American's marks from high school.

4.3.28 Women's Triple Jump

Figure 58 shows that most of the triple jump marks from high school by All-Americans range from 10.5 meters to 12.0 meters, with small amount outside of that range.

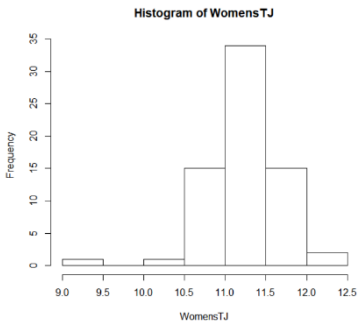


Fig. 58. Histogram of Women's triple jump All-American's marks from high school.

Figure 59 shows the numbers grouped closely together with the first quarter starting at 11.028 meters or 36′2″ and the third quarter at 11.493 meters or 37′8.5″. The average high school mark of the women's triple jump is 11.246 meters or 36′10.75″, the farthest mark being 12.020 meters or 39′5.25″ and the shortest being 9.499 meters or 31′2″. There are twelve high school marks for the women's triple jump that were not found, either due to the All-American's best high school mark and/or second best not being found.

```
 Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
9.499  11.028  11.300  11.246  11.493  12.020      12
```

Fig. 59. Summary of Women's triple jump All-American's marks from high school.

4.3.29 Men's Shot Put

The Histogram shown in Figure 60 shows the triple jump marks from high school by All-American's has a gradual increase as the distance increases, but the amount drops after 18 meters.

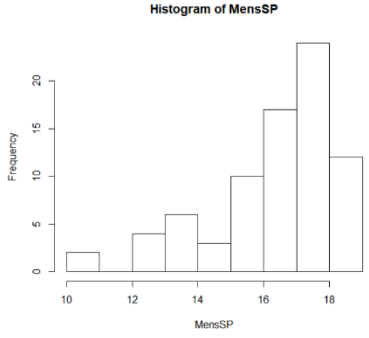


Fig. 60. Histogram of Men's Shot-Put All-American's marks from high school.

The numbers tell a similar story in Figure 61 with the first quarter starting at 15.67 meters or 51′5″, and third quarter at 17.65 meters or 57′11″. The average high school mark of the men's shot-put is 17.65 meters or 53′7.25″, the farthest mark being 18.52 meters or 60′9″ and shortest being 10.95 meters or 35′11″. There are two high school marks for the men's shot put that were not found, either due to the All-American's best high school mark and/or second best not being found

```
 Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
10.95   15.67   16.90   16.34   17.65   18.52       2
```

Fig. 61. Summary of Men's shot-put All-American's marks from high school.

4.3.30 Women's Shot Put

The triple jump marks shown in Figure 62 are from high school by All-American's and is like a bell curve with slightly bigger curve above 12.5 meters.

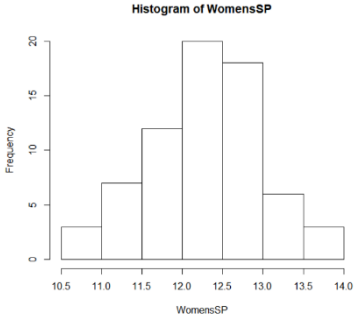


Fig. 62. Histogram of Women's shot-put All-American's marks from high school.

In Figure 63 the data starts with the first quarter at 11.84 meters or 38′10″ and the third quarter at 12.74 meters or 41′9.5″. The average high school mark of the women's shot-put is 12.27 meters or 40′3″, the farthest mark being 13.63 meters or 44′8.5″ and the shortest being 10.53 meters or 34′6.5″. There are eleven high school marks for the women's shot put that were not found, either due to the All-American's best high school mark and/or second best not being found.

```
 Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
10.53   11.84   12.26   12.27   12.74   13.63      11
```

Fig. 63. Summary of Women's shot-put All-American's marks from high school.

4.3.31 Men's Discus

Shown in Figure 64 many of the discus marks from high school by All-American's are from 40 meters to 55 meters, and with small amounts above and below the range.

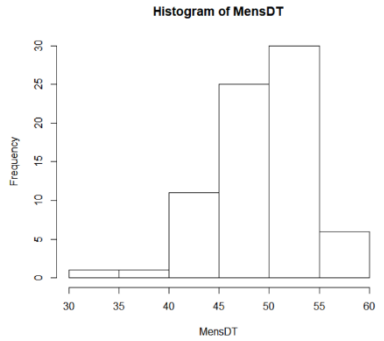


Fig. 64. Histogram of Men's Discus All-American's marks from high school.

Shown in Figure 65 is the data with the first quarter starting at 46.14 meters or 151'4.5", and third quarter at 52.57 meters or 172'5.5". The average high school mark of the men's discus is 49.34 meters or 161'10.5", the farthest mark being 59.87 meters or 196'5" and shortest being 30.18 meters or 99'0". There are six high school marks for the men's discus that were not found, either due to the All-American's best high school mark and/or second best not being found

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
30.18	46.14	49.91	49.34	52.57	59.87	6

Fig. 65. Summary of Men's discus All-American's marks from high school.

4.3.32 Women's Discus

Figure 66 shows the discus marks from high school by All-American's which contains a spike from 36 meters to 42 meters, with small groups lower and higher than this range.

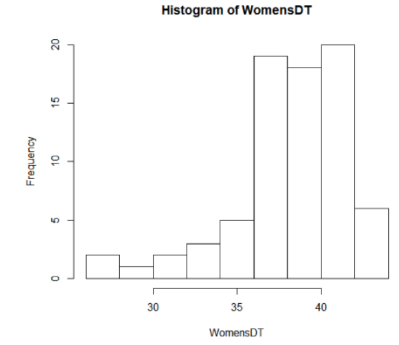


Fig. 66. Histogram of Women's discus All-American's marks from high school.

Figure 67 shows Figure 66 data with the first quarter starting at 36.99 meters or 121'4.25" and the third quarter at 40.66 meters or 133'4.75". The average high school mark of the women's discus is 38.22 meters or 125'4.75", the farthest mark being 43.28 meters or 142'0" and the shortest being 26.73 meters or 87'8.25". There are four high school marks for the women's discus that were not found, either due to the All-American's best high school mark and/or second best not being found.

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
26.73	36.99	39.07	38.22	40.66	43.28	4

Fig. 67. Summary of Women's discus All-American's marks from high school.

4.3.33 Men's Hammer

In Figure 68 the discus marks from high school by All-American's mostly fall in between 35 meters to 50 meters, with small groups lower and higher than this range. The high school marks are all discus marks, as the discus marks are the closest comparison to the hammer throw in college.

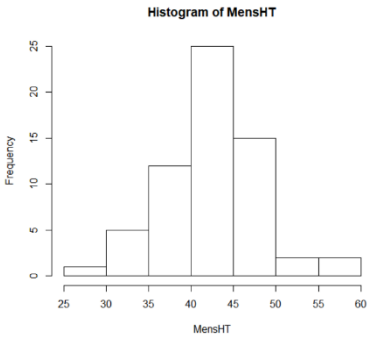


Fig. 68. Histogram of Men's hammer All-Americans, with discus marks from high school.

Figure 69 shows the first quarter starting at 39 meters or 127'11.5", and the third quarter at 45.24 meters or 148'5". The average high school mark of the women's discus is 42.43 meters or 139'0.25", the farthest mark being 57.35 meters or 188'2" and shortest being 28.45 meters or 93'4". There are eighteen high school marks for the men's discus that were not found, either due to the All-American's best high school mark and/or second best not being found.

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
28.45	39.00	42.24	42.43	45.24	57.35	18

Fig. 69. Summary of Men's hammer All-American's, with discus marks from high school.

4.3.34 Women's Hammer

Seen in Figure 70 the discus marks from high school by All-American's many of the marks are from 30 meters to 40 meters. The high school marks are all discus marks, as the discus marks are the closest comparison to the hammer throw in college.

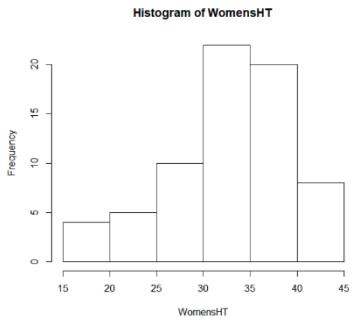


Fig. 70. Histogram of Women's Hammer All-American's, with discus marks from high school.

The numbers in Figure 71 show data from the first quarter starting at 29.97 meters or 98'4" and the third quarter at 37.11 meters or 121'9". The average high school mark of the women's discus is 32.82 meters or 107'8", the farthest mark being 43.31 meters or 142'1" and the shortest being

17.22 meters or 56′6″. There are eleven high school marks for the women's discus that were not found, either due to the All-American's best high school mark and/or second best not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  17.22   29.97   33.50   32.82   37.11   43.31      11
```

Fig. 71. Summary of Women's hammer All-American's, with discus marks from high school.

4.4 College PR vs High School PR

Another aspect to look at for the All-American's is the amount they improved in college from their high school PR. Section 4.4 is a breakdown between the college and high school PR, looking at the average improvement in college to understand how much athletes might improve in each event after being recruited. Not every event will be able to be compared due to not being the same event in college and high school; these events are the 5,000-meter, 10,000-meter, 400-meter hurdles, 3,000-meter steeplechase, and hammer throw. The 1,500-meter has been converted to 1,600-meter, so the high school and college times can be compared equally.

4.4.1 Men's 100 Meter

Figure 72 shows the 100-meter time of improvement from high school to college by All-American's. Improvement mostly falls in between no improvement to 0.75 seconds of improvement, with small amount lower and higher than this range.

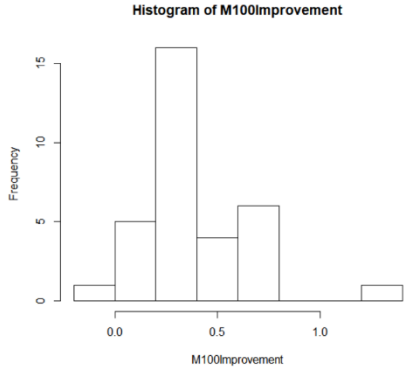


Fig. 72. Histogram of Men's 100-meter All-American's amount improved from high school.

In Figure 73 explains the data with the first quarter starting at 0.25 seconds of improvement and the third quarter at 0.59 seconds of improvement. The average high school improvement for the men's 100-meter was found to be 0.3933 seconds, the lowest amount of improvement being -0.02 seconds, meaning the high school PR being better than the college PR and the biggest improvement being 1.23 seconds. There are six high school marks for the men's 100-meter that were not found, due to the All-American's best high school time not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
-0.0200  0.2500  0.3300  0.3933  0.5900  1.2300       6
```

Fig. 73. Summary of Men's 100-meter All-American's amount of improvement from high school.

4.4.2 Women's 100 Meter

As shown in Figure 74 the 100-meter time of improvement from high school to college by All-American's show a vast amount of improvement from no improvement to 1.2 seconds of improvement.

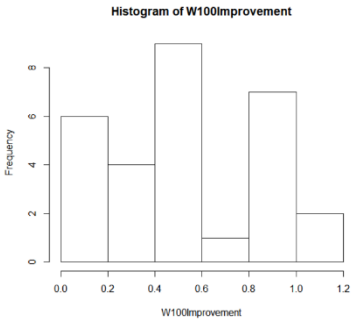


Fig. 74. Histogram of Women's 100-meter All-American's amount improved from high school.

Figure 75 shows there is wide variety in the data, with the first quarter starting at 0.26 seconds of improvement and the third quarter at 0.84 seconds of improvement. The average high school improvement for the women's 100-meter is 0.5321 seconds, the lowest amount of improvement being 0.09 seconds and the biggest improvement being 1.02 seconds. There are eleven high school marks for the women's 100-meter that were not found, due to the All-American's best high school time not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
 0.0900  0.2600  0.5200  0.5321  0.8400  1.0200      11
```

Fig. 75. Summary of Women's 100-meter All-American's amount of improvement from high school.

4.4.3 Men's 200 Meter

It can be seen in Figure 76 the 200-meter time of improvement from high school to college by All-American's there is a wide variety from no improvement to 2 seconds of improvement.

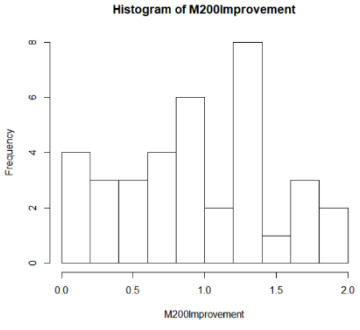


Fig. 76. Histogram of Men's 200-meter All-American's amount improved from high school.

The numbers in Figure 77 have the first quarter starting at 0.58 seconds of improvement and the third quarter at 1.37 seconds of improvement. The average high school improvement for the men's 200-meter is 0.9467 seconds, the lowest amount of improvement being 0 seconds, meaning the high school PR and the college PR were the same and the biggest improvement being 1.89 seconds. There are

four high school marks for the men's 200-meter that were not found, due to the All-American's best high school time not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  0.0000  0.5800  0.8950  0.9467  1.3700  1.8900       4
```

Fig. 77. Summary of Men's 200-meter All-American's amount of improvement from high school.

4.4.4 Women's 200 Meter

Looking at Figure 78 shows the 200-meter time of improvement from high school to college by All-American's shows a similar shape to a bell curve, ranging from no improvement to 3.5 seconds of improvement.

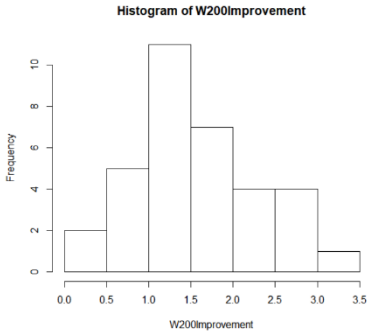


Fig. 78. Histogram of Women's 200-meter All-American's amount improved from high school.

Figure 79 shows spread in the data with the first quarter starting at 1.167 seconds of improvement and the third quarter at 1.97 seconds of improvement. The average high school improvement for the women's 200-meter is 1.616 seconds, the lowest amount of improvement being 0.3 seconds and the biggest improvement being 3.49 seconds. There are six high school marks for the women's 200-meter that were not found, due to the All-American's best high school time not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  0.300   1.167   1.490   1.616   1.970   3.490       6
```

Fig. 79. Summary of Women's 200-meter All-American's amount of improvement from high school.

4.4.5 Men's 400 Meter

Figure 80 shows a unique spread with the 400-meter time of improvement from high school to college by All-American's. Most of the improvement is from 3 seconds to no improvement, with a small amount more than 3 seconds of improvement.

Fig. 80. Histogram of Men's 400-meter All-American's amount improved from high school.

Looking at Figure 81 the improvement starts with the first quarter at 1.46 seconds of improvement and the third quarter at 2.81 seconds of improvement. The average high school improvement for the men's 400-meter is 2.407 seconds, the lowest amount of improvement being 0.41 seconds and the biggest improvement being 7.21 seconds. There are nine high school marks for the men's 400-meter that were not found, due to the All-American's best high school time not being found.

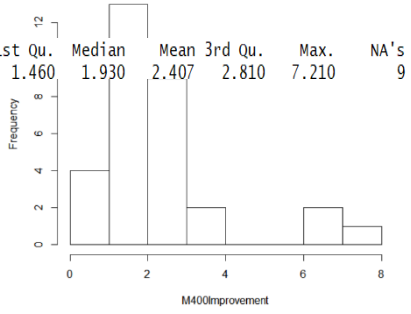
Fig. 81. Summary of Men's 400-meter All-American's amount of improvement from high school.

4.4.6 Women's 400 Meter

Majority of the improvement in Figure 82 for the 400-meter time of improvement from high school to college by All-American's ranges from 2 seconds to 4 seconds of

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  0.040   2.540   3.060   3.607   3.750   9.260       5
```

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  0.410   1.460   1.930   2.407   2.810   7.210       9
```



improvement, with small amounts higher and lower than that range.

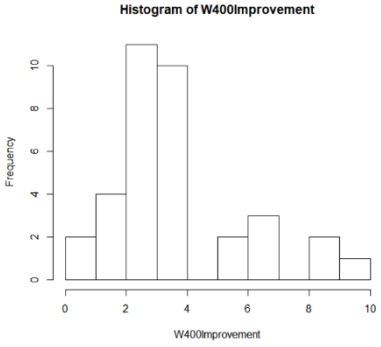


Fig. 82. Histogram of Women's 400-meter All-American's amount improved from high school.

Figure 83 shows the first quarter starting at 2.54 seconds of improvement and the third quarter at 3.75 seconds of improvement. The average high school improvement for the women's 400-meter is 3.607 seconds, the lowest amount of improvement being 0.04 seconds and the biggest improvement being 9.26 seconds. There are five high school marks for the women's 400-meter that were not found, due to the All-American's best high school time not being found.

Fig. 83. Summary of Women's 400-meter All-American's amount of improvement from high school.

4.4.7 Men's 800 Meter

The 800-meter time of improvement from high school to college by All-American's, seen in Figure 84, shows most of the improvement is from 10 seconds to no improvement, with a small amount more than 10 seconds of improvement.

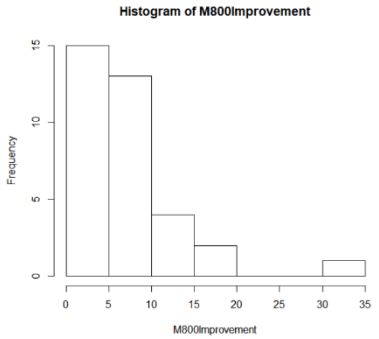


Fig. 84. Histogram of Men's 800-meter All-American's amount improved from high school.

In Figure 85 the numbers show the first quarter starting at 4.45 seconds of improvement and the third quarter at 9 seconds of improvement. The average high school improvement for the men's 800-meter is 7.757 seconds, the lowest amount of improvement being 1.1 seconds and the largest improvement being 34.7 seconds. There are five high school marks for the men's 800-meter that were not found, due to the All-American's best high school time not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  1.100   4.450   5.400   7.757   9.000  34.700       5
```

Fig. 85. Summary of Men's 800-meter All-American's amount of improvement from high school.

4.4.8 Women's 800 Meter

Figure 86 shows the 800-meter time of improvement from high school to college by All-American's, which have much of the improvement from 5 seconds to 15 seconds, with small amounts higher and lower than that range.

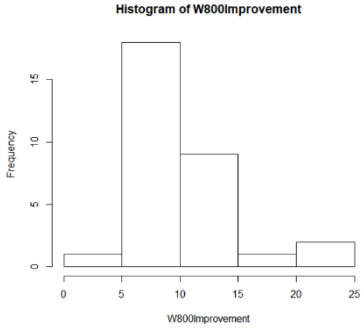


Fig. 86. Histogram of Women's 800-meter All-American's amount improved from high school.

Figure 87 shows the numbers are spot on with the first quarter starting at 7.45 seconds of improvement and the third quarter at 12 seconds of improvement. The average high school improvement for the women's 800-meter is 10.08 seconds, the lowest amount of improvement being 1.3 seconds and the biggest improvement being 21.8 seconds. There are nine high school marks for the women's 800-meter that were not found, due to the All-American's best high school time not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  1.30    7.45    8.70   10.08   12.00   21.80       9
```

Fig. 87. Summary of Women's 800-meter All-American's amount of improvement from high school.

4.4.9 Men's 1,500 Meter

In Figure 88 the 1,600-meter time of improvement from high school to college by All-American's show most of the improvement is from 10 seconds to 25 seconds. The college PR's have been converted from 1,500-meter times to 1,600-meter times, so they can be compared to the high school 1,600-meter PR's.

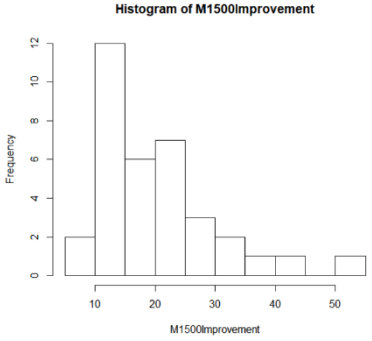


Fig. 88. Histogram of Men's 1,500-meter All-American's, with the 1,600-meter amount improved from high school.

As seen in Figure 89 the numbers show the first quarter starting at 13.75 seconds of improvement and the third quarter at 23.6 seconds of improvement. The average high school improvement for the men's 1,600-meter is 20.23 seconds, the lowest amount of improvement being 8.4 seconds and the biggest improvement being 51 seconds. There are five high school marks for the men's 1,600-meter that were not found, due to the All-American's best high school time not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
   8.40   13.75   17.50   20.23   23.60   51.00       5
```

Fig. 89. Summary of Men's 1,500-meter All-American's, with the 1,600-meter amount of improvement from high school.

4.4.10 Women's 1,500 Meter

Figure 90 depicts the 1,600-meter time of improvement from high school to college by All-American's have most of the improvement from 10 seconds to 40 seconds. The college PR's have been converted from 1,500-meter times to 1,600-meter times, so they can be compared to the high school 1,600-meter PR's.

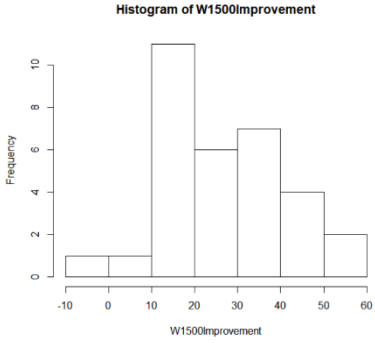


Fig. 90. Histogram of Women's 1,500-meter All-American's, with 1,600-meter amount improved from high school.

Figure 91 shows that the first quarter starts at 14.95 sec-

onds of improvement and the third quarter at 38.15 seconds of improvement. The average high school improvement for the women's 1,600-meter is 26.41 seconds, the lowest amount of improvement being -4 seconds, meaning the high school PR being better than the college PR and the biggest improvement being 56.4 seconds. There are eight high school marks for the women's 1,600-meter that were not found, due to the All-American's best high school time not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  -4.00   14.95   22.30   26.41   38.15   56.40       8
```

Fig. 91. Summary of Women's 1,500-meter All-American's, with 1,600-meter amount of improvement from high school.

4.4.11 Men's 110 Meter Hurdles

In Figure 92 the 110-meter hurdles time of improvement from high school to college by All-American's mostly fall in between 1 second to no improvement, with small amounts higher and lower than the one second range.

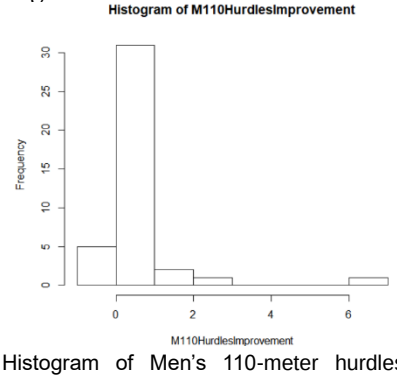


Fig. 92. Histogram of Men's 110-meter hurdles All-American's amount improved from high school.

Figure 93 shows the first quarter starts at 0.1775 seconds of improvement and the third quarter at 0.6875 seconds of improvement. The average high school improvement for the men's 110-meter hurdles is 0.6438 seconds, the lowest amount of improvement being -0.09 seconds, meaning the high school PR being better than the college PR and the biggest improvement being 6.72 seconds.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
-0.0900  0.1775  0.4600  0.6438  0.6875  6.7200
```

Fig. 93. Summary of Men's 110-meter hurdles All-American's amount of improvement from high school.

4.4.12 Women's 100 Meter Hurdles

Shown in Figure 94 the 100-meter hurdles time of improvement from high school to college by All-American's has a gradual increase through 1.5 seconds of improvement, with a drop off higher than 1.5 seconds of improvement.

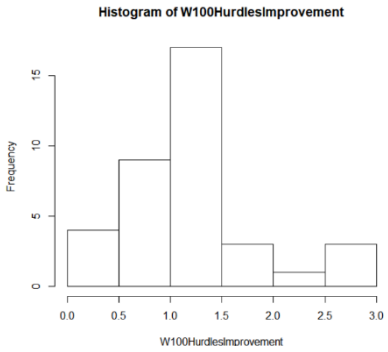


Fig. 94. Histogram of Women's 100-meter hurdles All-Americans amount improved from high school.

The visual in Figure 95 has the first quarter starting at 0.75 seconds of improvement and the third quarter at 1.45 seconds of improvement. The average high school improvement for the women's 100-meter hurdles is 1.192 seconds, the lowest amount of improvement being 0.17 seconds and the biggest improvement being 2.86 seconds. There are three high school marks for the women's 100-meter hurdles that were not found, due to the All-American's best high school time not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  0.170   0.750   1.120   1.192   1.450   2.860       3
```

Fig. 95. Summary of Women's 100-meter hurdles All-American's amount of improvement from high school.

4.4.13 Men's High Jump

Looking at Figure 96 the high jump distance of improvement from high school to college by All-American's falls mostly in between from 0.05 meters to 0.15 meters, with a gradual decline in the amount as the increase in the amount of improvement.

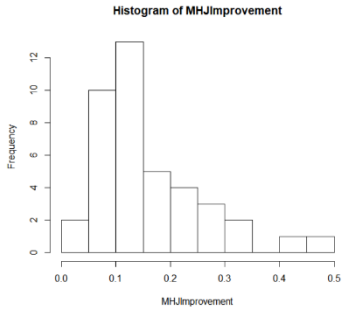


Fig. 96. Histogram of Men's high jump All-American's amount improved from high school.

Figure 97 shows first quarter data starting at 0.089 meters or 3.5 inches of improvement and the third quarter at 0.209 meters or 8.22 inches of improvement. The average high school improvement for the men's high jump is 0.1656 meters or 6.5 inches, the lowest amount of improvement being 0.011 meters or 0.43 inches and the biggest improvement being 0.475 meters or 1′6.7″. There are two high school marks for the men's high jump that were not found, due to the All-American's best high school mark not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
 0.0110  0.0890  0.1400  0.1656  0.2090  0.4750       2
```

Fig. 97. Summary of Men's high jump All-American's amount of im-

provement from high school.

4.4.14 Women's High Jump

Figure 98 shows the high jump distance of improvement from high school to college by All-American's with a gradual decline from no improvement to 0.25 meters, with one mark being lower than no improvement.

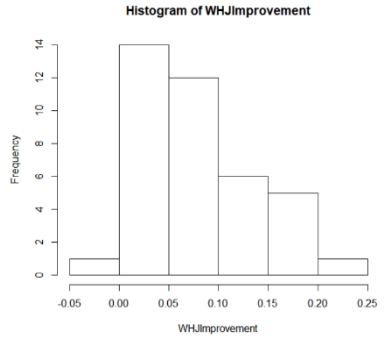


Fig. 98. Histogram of Women's high jump All-American's amount improved from high school.

The numbers in Figure 99 show the first quarter starts at 0.034 meters or 1.33 inches of improvement and the third quarter at 0.119 meters or 4.68 inches of improvement. The average high school improvement for the women's high jump is 0.07726 meters or 3.04 inches, the lowest amount of improvement being -0.001 meters or –0.03 inches and the biggest improvement being 0.226 meters or 8.89 inches. There are three high school marks for the women's high jump that were not found, due to the All-American's best high school mark not being found.

```
    Min.  1st Qu.   Median     Mean  3rd Qu.     Max.     NA's
-0.00100  0.03400  0.05900  0.07726  0.11900  0.22600        3
```

Fig. 99. Summary of Women's high jump All-American's amount of improvement from high school.

4.4.15 Men's Pole Vault

Figure 100 shows pole vault distance of improvement from high school to college by All-American's with much of the improvement from 0.2 meters to 0.8 meters, with small amounts higher than that range.

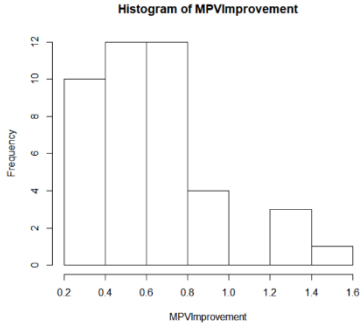


Fig. 100. Histogram of Men's pole vault All-American's amount improved from high school.

Figure 101 tells us the same thing as Figure 100 with the first quarter starting at 0.4363 meters or 1'5.17" of improvement and the third quarter at 0.727 meters or 2'4.62" of improvement. The average high school improvement for the men's pole vault is shown to be 0.6198 meters or 2'0.4", the lowest amount of improvement being 0.254 meters or 10 inches and the biggest improvement being 1.405 meters or 4'7.31".

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 0.2540  0.4363  0.5915  0.6198  0.7270  1.4050
```

Fig. 101. Summary of Men's pole vault All-American's amount of improvement from high school.

4.4.16 Women's Pole Vault

Figure 102 shows the pole vault distance of improvement from high school to college by All-American's, as an approximate left leaning bell curve.

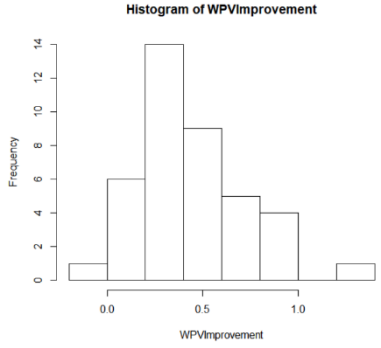


Fig. 102. Histogram of Women's pole vault All-American's amount improved from high school.

Figure 103 represents a left leaning bell curve with the first quarter starting at 0.243 meters or 9.56 inches of improvement and the third quarter at 0.582 meters or 1'10.91" of improvement. The average high school improvement for the women's pole vault is 0.4406 meters or 1'5.34", the lowest amount of improvement being -0.013 meters or –0.51 inches and the biggest improvement being 1.205 meters or 3'11.44". There are three high school marks for the women's pole vault that were not found, due to the All-American's best high school mark not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
-0.0130  0.2430  0.3950  0.4406  0.5820  1.2050       3
```

Fig. 103. Summary of Women's pole vault All-American's amount of improvement from high school.

4.4.17 Men's Long Jump

Looking at Figure 104 for the long jump distance of improvement from high school to college by All-American's shows the bulk of the improvement from no improvement to 1 meter, with small amounts higher than that range.

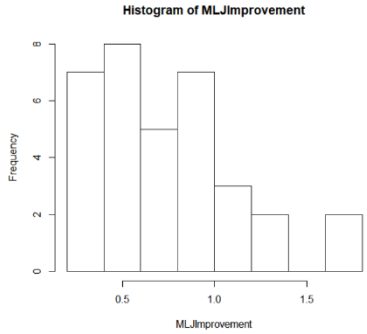


Fig. 104. Histogram of Men's long jump All-American's amount improved from high school.

Figure 105 shows similar data representation to Figure 104 with the first quarter starting at 0.4815 meters or 1′6.95″ of improvement and the third quarter at 0.9203 meters or 3′0.23″ of improvement. The average high school improvement for the men's long jump is 0.7496 meters or 2′5.51″, the lowest amount of improvement being 0.246 meters or 9.68 inches and the biggest improvement being 1.756 meters or 5′9.13″. There are six high school marks for the men's long jump that were not found, due to the All-American's best high school mark not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
 0.2460  0.4815  0.7165  0.7496  0.9203  1.7560       6
```

Fig. 105. Summary of Men's long jump All-American's amount of improvement from high school.

4.4.18 Women's Long Jump

Figure 106 shows the long jump distance of improvement from high school to college by All-American's with the graph looking somewhat even except from the improvement from 0.2 meters to 0.4 meters, while it spiked.

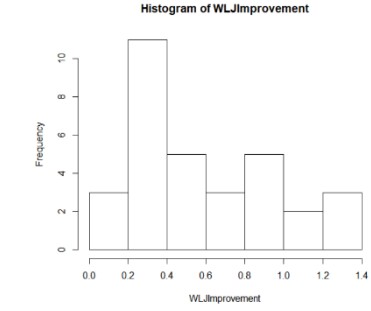


Fig. 106. Histogram of Women's long jump All-American's amount improved from high school.

In Figure 107 the spike shown above has effects on the numbers with the first quarter starting at 0.3262 meters or 1′0.84″ of improvement and the third quarter at 0.8137 meters or 2′8.03″ of improvement. The average high school improvement for the women's long jump is 0.5684 meters or 1′10.37″, the lowest amount of improvement being 0.064 meters or 2.51 inches and the biggest improvement being 1.264 meters or 4′1.76″. There are eight high school marks for the women's long jump that were not found, due to the All-American's best high school mark not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
 0.0640  0.3262  0.4110  0.5684  0.8137  1.2640       8
```

Fig. 107. Summary of Women's long jump All-American's amount of improvement from high school.

4.4.19 Men's Triple Jump

Figure 108 is showing the long jump distance of improvement from high school to college by All-American's with most of the improvement from 0.5 meters to 2 meters, with small amounts higher and lower than that range.

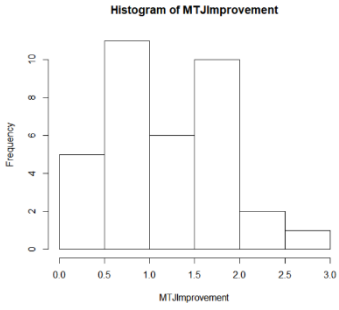


Fig. 108. Histogram of Men's triple jump All-American's amount improved from high school.

Shown in Figure 109 the numbers illustrate the first quarter starting at 0.7505 meters or 2′5.54″ of improvement and the third quarter at 1.678 meters or 5′6.06″ of improvement. The average high school improvement for the men's triple jump is 1.1848 meters 3′10.64″, the lowest amount of improvement being 0.04 meters 1.57 inches and the biggest improvement being 2.629 meters 8′7.5″. There are five high school marks for the men's triple jump that were not found, due to the All-American's best high school mark not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
 0.0400  0.7505  1.2130  1.1848  1.6780  2.6290       5
```

Fig. 109. Summary of Men's triple jump All-American's amount of improvement from high school.

4.4.20 Women's Triple Jump

Seen in Figure 110 the triple jump distance of improvement from high school to college by All-American's are mostly from 0.25 meters to 1.25 meters, with small amounts outside of that range.

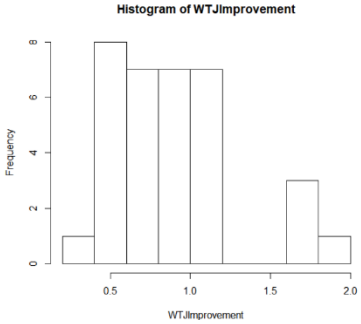


Fig. 110. Histogram of Women's triple jump All-American's amount improved from high school.

The visual in Figure 111 starts the first quarter at 0.5815 meters or 1′10.89″ of improvement and the third quarter at 1.035 meters or 3′4.74″ of improvement. The average

high school improvement for the women's triple jump is 0.8858 meters or 2′10.87″, the lowest amount of improvement being 0.282 meters or 11.1 inches and the biggest improvement being 1.928 meters or 6′3.9″. There are five high school marks for the women's triple jump that were not found, due to the All-American's best high school mark not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  0.2820  0.5815  0.8355  0.8858  1.0350  1.9280       6
```

Fig. 111. Summary of Women's triple jump All-American's amount of improvement from high school.

4.4.21 Men's Shot Put

Figure 112 looks at the shot-put distance of improvement from high school to college by All-American's with most of the improvement from -1 meters to 2 meters.

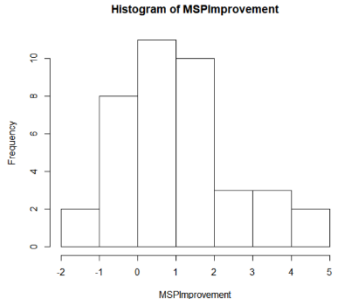


Fig. 112. Histogram of Men's shot-put All-American's amount improved from high school.

The numbers in Figure 113 represent data with the first quarter starting at 0.0285 meters or 1.12 inches of improvement and the third quarter at 1.663 meters or 5′5.47″ of improvement. The average high school improvement for the men's shot-put is 1.062 meters or 3′5.81″, the lowest amount of improvement being -1.197 meters or 3′11.12″ and the biggest improvement being 4.102 meters 13′5.49″. There is one high school mark for the men's shot put that was not found, due to the All-American's best high school mark not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
 -1.1970  0.0285  0.9110  1.0620  1.6630  4.1020       1
```

Fig. 113. Summary of Men's shot-put All-American's amount of improvement from high school.

4.4.22 Women's Shot Put

Looking at Figure 114, the shot-put distance of improvement from high school to college by All-American's, improvement with a spike from 2 meters to 2.5 meters can be seen.

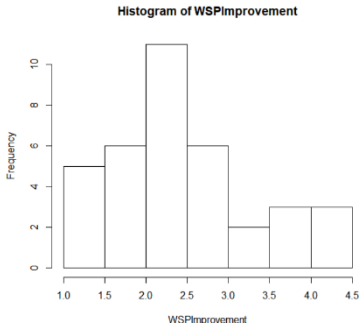


Fig. 114. Histogram of Women's shot-put All-American's amount improved from high school.

In Figure 115 the first quarter starts at 1.833 meters or 6′0.16″ of improvement and the third quarter at 2.786 meters or 9′1.68″ of improvement. The average high school improvement for the women's shot-put is 2.413 meters or 9′11″, the lowest amount of improvement being 1.052 meters or 3′5.41″ and the biggest improvement being 4.01 meters 13′1.87″. There are four high school marks for the women's shot put that were not found, due to the All-American's best high school mark not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  1.052   1.833   2.257   2.413   2.786   4.010       4
```

Fig. 115. Summary of Women's shot-put All-American's amount of improvement from high school.

4.4.23 Men's Discus

The visual in Figure 116 of the discus distance of improvement from high school to college by All-American's shows that most of the improvement from -5 meters to 10 meters, with small amounts higher than that range.

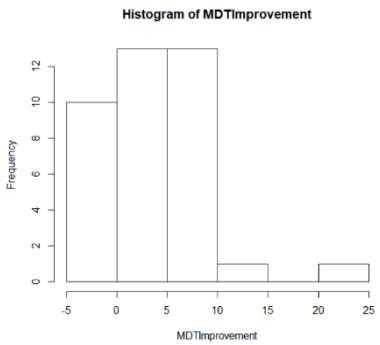


Fig. 116. Histogram of Men's discus All-American's amount improved from high school.

Shown in Figure 117 the marks have a vast variety of improvements with the first quarter starting at –0.061 meters or –2.4 inches of improvement and the third quarter at 7.299 meters or 23′11.36″ of improvement. The average high school improvement for the men's discus is 3.964 meters 13′0.06″, the lowest amount of improvement being -2.237 meters or –7'4.07″ and the biggest improvement being 20.475 meters or 67′2.1″. There are two high school marks for the men's discus that were not found, due to the All-American's best high school mark not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
 -2.237  -0.061   3.064   3.964   7.299  20.475       2
```

Fig. 117. Summary of Men's discus All-American's amount of im-

provement from high school.

4.4.24 Women's Discus

Figure 118 shows the discus distance of improvement from high school to college by All-American's with most of the improvements in between 7.5 meters to 10 meters.

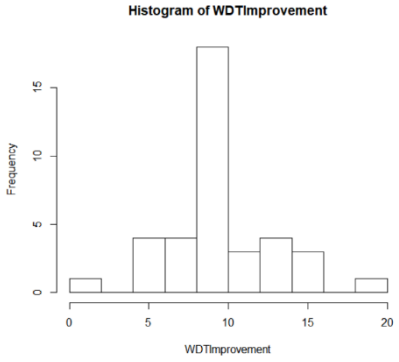


Fig. 118. Histogram of Women's discus All-American's amount improved from high school.

Consulting Figure 119 illustrates the first quarter starts at 8.059 meters or 26'5.28" of improvement and the third quarter at 10.322 meters or 33'10.37" of improvement. The average high school improvement for the women's discus is 9.422 meters or 30'10.94", the lowest amount of improvement being 1.823 meters 5'11.77" and the biggest improvement being 18.073 meters or 59'3.53". There are two high school marks for the women's discus that were not found, due to the All-American's best high school mark not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  1.823   8.059   9.196   9.422  10.322  18.073       2
```

Fig. 119. Summary of Women's discus All-American's amount of improvement from high school.

4.5 Decathlon

The Decathlon dataset looks at the high school events the decathlon All-American's participated in. It contains nine out of the ten events, as Javelin is an uncommon event in high school track and field. The aspects analyzed in the Decathlon dataset are the same as the All-American dataset, looking at the break down of each event's high school times and marks and the improvement of each event from high school to college. Another aspect that was analyzed is different from the All-American dataset is investigating how many decathlons athletes participated in each event in high school to find which events done in high school are more likely to turn out an All-American Decathlon athlete.

4.5.1 Events of Decathlon in High School

The number of events the All-American's that participated in high school is a good way to find what high school athletes to recruit to become a Decathlon athlete in college. In Wisconsin high school track and field, athletes are allowed to participate in four events max, with at most three of them either being field or running events. The top four events that are participated in high school by the Decathlon All-American athletes will be taken into consideration as the type of athletes that will be looked at as potential Decathlon athletes in college. As shown in Figure 120 the top four events participated in from Decathlon All-American's are High Jump, 110-meter Hurdles, Long Jump, and 400-meter. There is a drop off after the top three events, High Jump, 110-meter Hurdles, and

```
                                  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
HS_HJ_PR_in_Meters HS_110m_Hurdles_PR HS_LJ_PR_in_Meters HS_400M_PR HS_100M_PR HS_JP_PR_in_Meters
                                  11.27   11.57   12.28   12.05   12.46   12.84      29
                32                26                24      12      11               9
HS_PV_PR_in_Meters HS_DT_PR_in_Meters HS_1600m_PR
                 8                  6           2
```

Long Jump. Clearly the 1,600-meter event is the least participated in from Decathlon's in high school.

Fig. 120. Summary of Decathlon's All-American's participation in events from high school.

4.5.2 Decathlon High School Times by Event

Section 4.5 will break down by event what the high school times and marks of the event are desirable for recruitment based off the times and marks of the Decathlon's. The breakdown of this analysis includes histograms as a visual way to see where an average of the Decathlon's performed in high school. There is a summary with numbers to help better understand the data the histogram is showing.

4.5.2.1 Decathlon 100-meter

Shown in Figure 121, the 100-meter times from high school by Decathlon's have a variety of times from 11 seconds to 13 seconds.

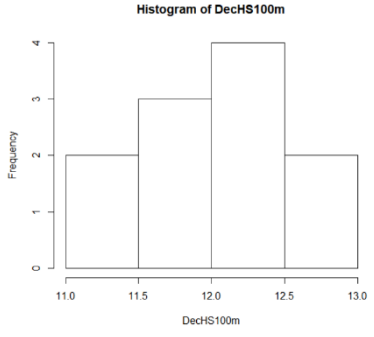


Fig. 121. Histogram of Decathlon 100-meter times from high school.

Figure 122 explains the above graph with the first quarter starting at 11.57 seconds and third quarter at 12.46 seconds. The average high school time for the Decathlon 100-meter is 12.05 seconds, the slowest time being 12.84 seconds and the fastest time being 11.27 seconds. There are twenty-nine high school times for the Decathlon 100-meter that were not found, due to the Decathlon's best high school time not being found.

Fig. 122. Summary of Decathlon 100-meter times from high school.

4.5.2.2 Decathlon 400-meter

The 400-meter times from high school by Decathlons, shown in Figure 123 have a spread of times from 48 seconds to 60 seconds.

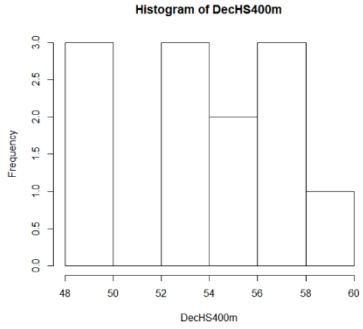


Fig. 123. Histogram of Decathlon 400-meter times from high school.

Figure 124 visualizes the numbers from Figure 123 with the first quarter starting at 51.23 seconds and the third quarter at 57.12 seconds. The average high school time for the Decathlon 400-meter is 53.78 seconds, the slowest time being 58.20 seconds and the fastest time being 49.21 seconds. There are twenty-eight high school times for the Decathlon 400-meter that were not found, due to the Decathlon's best high school time not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  49.21   51.53   53.77   53.78   57.12   58.20      28
```

Fig. 124. Summary of Decathlon 400-meter times from high school.

4.5.2.3 Decathlon 1,600-meter

There are two 1,600-meter high school times for the Decathlon dataset, which is a small data pool to analyze. According to phy.listu.edu, the number of data points enough to analyze and come to a conclusion about is six data points. Since there are only two data points for the Decathlon 1,600-meter the data cannot be analyzed.

4.5.2.4 Decathlon 110-meter Hurdles

Looking at Figure 125, the 110-meter hurdles times from high school by Decathlon's it can be seen there is a wide variety of times, with a big spike from 15 seconds to 16 seconds.

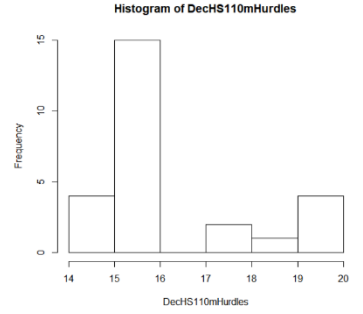


Fig. 125. Histogram of Decathlon 110-meter hurdles times from high school.

Figure 126 starts with the first quarter at 15.12 seconds and the third quarter at 16.87 seconds. The average high school time for the Decathlon 110-meter hurdles is 16.16 seconds, the slowest time being 19.23 seconds and the fastest time being 14.68 seconds. There are fourteen high school times for the Decathlon 110-meter hurdles that were not found, due to the Decathlon's best high school time not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  14.68   15.12   15.51   16.16   16.87   19.23      14
```

Fig. 126. Summary of Decathlon 110-meter hurdles times from high school.

4.5.2.5 Decathlon Long Jump

As seen in Figure 127, the Long Jump marks from high school by Decathlon's with a wide variety of times between 5 meters to 7 meters.

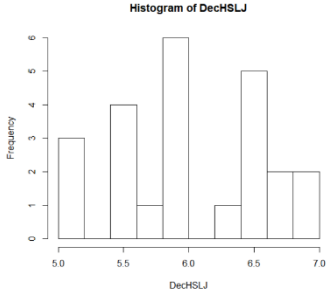


Fig. 127. Histogram of Decathlon Long Jump marks from high school.

The numbers in Figure 128 tell represent data with the first quarter starting at 5.582 meters or 18'3.76" and the third quarter at 6.527 meters or 21'4.96". The average high school mark for the Decathlon long jump is 6.031 meters or 19'9.44", the lowest mark being 5.181 meters or 16'11.97" and the highest mark being 6.858 meters or 22'6". There are sixteen high school marks for the Decathlon long jump that were not found, due to the Decathlon's best high school time not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  5.181   5.582   5.935   6.031   6.527   6.858      16
```

Fig. 128. Summary of Decathlon Long jump marks from high school.

4.5.2.6 Decathlon High Jump

The High Jump marks from high school by Decathlon's in Figure 129 show a gradual increase in the amount as the distance increases, with a few of the distances not following that trend.

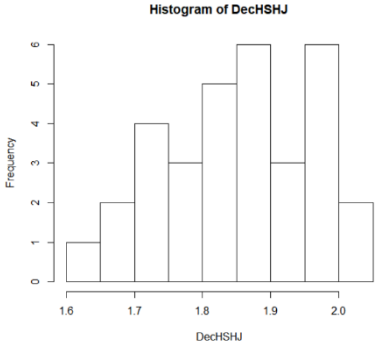


Fig. 129. Histogram of Decathlon High Jump marks from high school.

Figure 130 visualizes the first quarter starting at 1.778 meters or 5'10" the third quarter at 1.936 meters or 6'4.22". The average high school mark for the Decathlon high jump is 1.856 meters or 6'2.07", the shortest mark being 1.63 meters or 5'4" and the highest mark being

2.006 meters or 6’7”. There are eight high school marks for the Decathlon high jump that were not found, due to the Decathlon's best high school mark not being found.

```
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
 1.630   1.778   1.879   1.856   1.936   2.006       8
```

Fig. 130. Summary of Decathlon high jump marks from high school.

4.5.2.7 Decathlon Pole Vault

Seen in Figure 131, the Pole Vault marks gradually decrease in amount as the height increases.

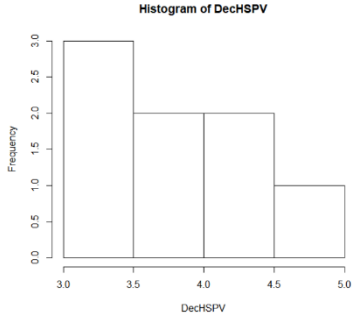


Fig. 131. Histogram of Decathlon Pole Vault marks from high school.

Figure 132 describes tight heights with the first quarter starting at 3.2 meters or 10’6” and the third quarter at 4.19 meters or 13’8.96”. The average high school mark for the Decathlon pole vault is 3.791 meters or 12’5.25”, with the shortest mark being 3.2 meters or 10’6” and the highest mark being 4.724 meters or 15’6”. There are thirty-two high school marks for the Decathlon pole vault that were not found, due to the Decathlon's best high school mark not being found.

```
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
 3.200   3.200   3.733   3.791   4.190   4.724      32
```

Fig. 132. Summary of Decathlon pole vault marks from high school.

4.5.2.8 Decathlon Shot Put

Figure 133 shows the Shot-Put marks from high school by Decathlon with all but two marks falling between 12 meters to 13 meters.

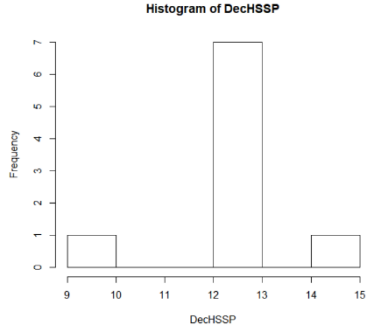


Fig. 133. Histogram of Decathlon Shot Put marks from high school.

In Figure 134 the numbers illustrate the first quarter starting at 12.249 meters or 40’2.25” and the third quarter at 12.89 meters or 42’3.5”. The average high school mark for the Decathlon shot put is 12.283 meters or 40’3.58”, the shortest mark being 9.347 meters or 30’8” and the farthest mark being 14.02 meters or 46’0”. There are thirty-one high school marks for the Decathlon pole vault that were not found, due to the Decathlon's best high school mark not being found.

```
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
 9.347  12.249  12.249  12.283  12.890  14.020      31
```

Fig. 134. Summary of Decathlon shot put marks from high school.

4.5.2.9 Decathlon Discus

For the last event, Figure 135 shows the Discus marks from high school by Decathlon’s with all but two marks falling in between 35 meters to 40 meters.

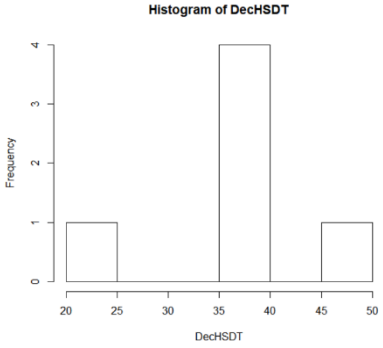


Fig. 135. Histogram of Decathlon Discus marks from high school.

Figure 136 outlines what was said in Figure 135 with the first quarter starting at 35.82 meters or 117’6.25” and the third quarter at 36.07 meters or 118’4”. The average high school mark for the Decathlon discus is 35.65 meters or 116’11.5”, the shortest mark being 21.29 meters or 69’10” and the farthest mark being 48.67 meters or 159’8”. There are thirty-four high school marks for the Decathlon discus that were not found, due to the Decathlon's best high school mark not being found.

```
  Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
 21.29   35.82   36.07   35.65   36.07   48.67      34
```

Fig. 136. Summary of Decathlon discus marks from high school.

4.5.3 Decathlon High School PR vs College PR

Another aspect to look at for the Decathlons is the amount the athletes improved from their high school PR. This section will include a breakdown between the college PR and high school PR, looking at the average improvement in college to understand how much athletes might improve in each event. Not every event will be able to be compared as the 1,500-meter only has two high school times, which as previously mentioned is too few data points to analyze.

4.5.3.1 Decathlon 100-meter

Breaking down Figure 137, the 100-meter improvement from high school by Decathlons are bunched into two different groups, one less than 0.5 seconds and the other greater than 0.75 seconds.

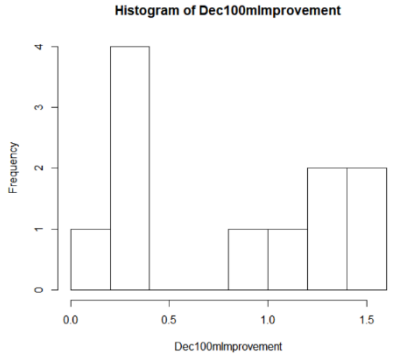


Fig. 137. Histogram of Decathlon 100-meter amount improved from high school.

Figure 138 shows first quarter data starting at 0.27 seconds of improvement and the third quarter at 1.315 seconds of improvement. The average high school improvement for the Decathlon 100-meter is 0.81 seconds, the lowest improvement being 0.18 seconds and the biggest improvement being 1.48 seconds. There are twenty-nine high school times for the Decathlon 100-meter that were not found, due to the Decathlon's best high school time not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  0.180   0.270   0.860   0.810   1.315   1.480      29
```

Fig. 138. Summary of Decathlon 100-meter amount improved from high school.

4.5.3.2 Decathlon 400-meter

After looking at Figure 139, the 400-meter improvement from high school by Decathlons it can be seen there are two spikes from no improvement to 2 seconds and 6 seconds to 8 seconds, with small amounts between the ranges and another higher than the rest.

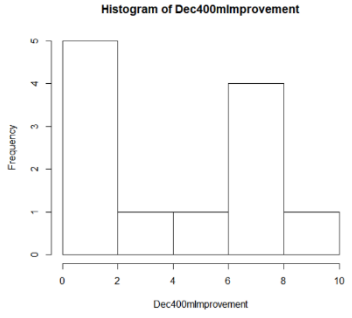


Fig. 139. Histogram of Decathlon 400-meter amount improved from high school.

Looking at Figure 140 numbers show the first quarter starting at 1.41 seconds of improvement and the third quarter at 6.2 seconds of improvement. The average high school improvement for the Decathlon 400-meter is 3.947 seconds, the lowest improvement being 0.99 seconds and the biggest improvement being 8.17 seconds. There are twenty-eight high school times for the Decathlon 400-meter that were not found, due to the Decathlon's best high school time not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  0.990   1.410   3.730   3.947   6.200   8.170      28
```

Fig. 140. Summary of Decathlon 400-meter amount improved from high school.

4.5.3.3 Decathlon 110-meter Hurdles

Figure 141, the 110-meter hurdles improvement from high school by Decathlons show an interesting graph with two separate, gradual rises with the first from –2 seconds to 1 second improvement being a greater raise than the second group from 1 second to 4 seconds of improvement.

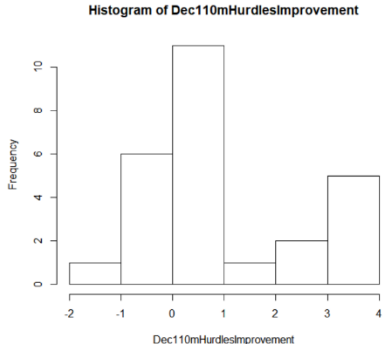


Fig. 141. Histogram of Decathlon 110-meter hurdles amount improved from high school.

The numbers in Figure 142 explain the histogram above with the first quarter starting at 0.015 seconds of improvement and the third quarter at 1.903 seconds of improvement. The average high school improvement for the Decathlon 110-meter hurdles is 0.97 seconds, the lowest improvement being -1.15 seconds and the biggest improvement being 3.99 seconds. There are fourteen high school times for the Decathlon 110-meter hurdles that were not found, due to the Decathlon's best high school time not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
 -1.150   0.015   0.350   0.970   1.903   3.990      14
```

Fig. 142. Summary of Decathlon 110-meter hurdles amount improved from high school.

4.5.3.4 Decathlon Long Jump

Figure 143 shows the long jump improvement from high school by Decathlon that contains a decrease in length as improvement increases.

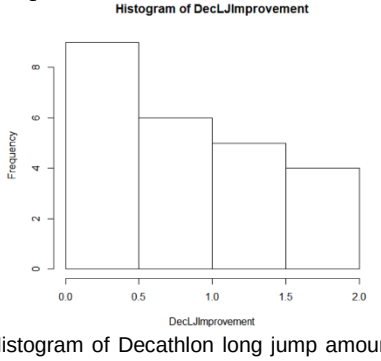


Fig. 143. Histogram of Decathlon long jump amount improved from high school.

Figure 144 describes how the first quarter starts at 0.4012 meters or 1’3.75” of improvement and the third quarter at 1.1125 meters or 3’7.75” of improvement. The average high school improvement for the Decathlon long jump is

0.8515 meters 2’9.5”, the lowest improvement being 0.073 meters or 2.87 inches and the biggest improvement being 1.999 meters or 6’6.7”. There are sixteen high school marks for the Decathlon long jump that were not found, due to the Decathlon's best high school mark not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
 0.0730  0.4012  0.9540  0.8515  1.1125  1.9990      16
```

Fig. 144. Summary of Decathlon long jump amount improved from high school.

4.5.3.5 Decathlon High Jump

Shown in Figure 145, the high jump improvement from high school by Decathlon’s looks similar to a bell curve, with steep drops on the ends.

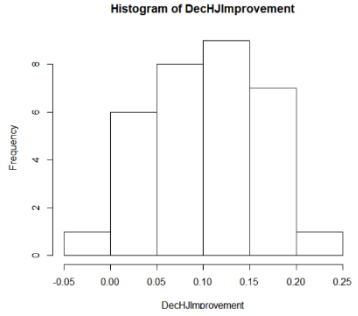


Fig. 145. Histogram of Decathlon high jump amount improved from high school.

Figure 146 starts with the first quarter at 0.0585 meters or 2.3 inches of improvement and the third quarter at 0.1368 meters or 5.38 inches of improvement. The average high school improvement for the Decathlon high jump is 0.1 meters or 3.93 inches, the lowest improvement being -0.001 meters or –0.03 inches and the biggest improvement being 0.234 meters or 9.21 inches. There are eight high school marks for the Decathlon high jump that were not found, due to the Decathlon's best high school mark not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
-0.0010  0.0585  0.1020  0.1000  0.1368  0.2340       8
```

Fig. 146. Summary of Decathlon high jump amount improved from high school.

4.5.3.6 Decathlon Pole Vault

Looking at Figure 147, the pole vault improvement from high school by Decathlon, there is a spike from 1 meter to 1.2 meter with small groups lower than that range.

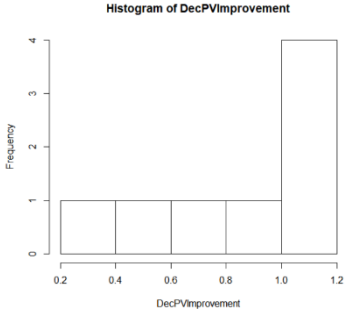


Fig. 147. Histogram of Decathlon pole vault amount improved from high school.

In Figure 148 results show the first quarter starting at 0.6172 meters or 2’0.29” of improvement and the third quarter at 1.2 meters or 3’11.25” of improvement. The average high school improvement for the Decathlon pole vault is 0.8858 meters or 2’10.87”, the lowest improvement being 0.306 meters or 1 foot and the biggest improvement being 1.2 meters 3’11.25”. There are thirty-two high school marks for the Decathlon pole vault that were not found, due to the Decathlon's best high school mark not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
 0.3060  0.6172  0.9815  0.8858  1.2000  1.2000      32
```

Fig. 148. Summary of Decathlon pole vault amount improved from high school.

4.5.3.7 Decathlon Shot Put

Figure 149, the shot-put improvement from high school by Decathlon, depicts a main spike from –0.5 meter to no improvement.

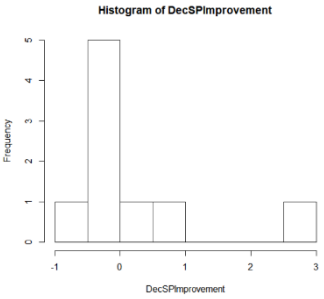


Fig. 149. Histogram of Decathlon shot put amount improved from high school.

In Figure 150 the first quarter starts at –0.369 meters or –1'2.52” of improvement and the third quarter at 0.207 meters or 8.14 inches of improvement. The average high school improvement for the Decathlon shot-put is 0.1181 meters or 4.64 inches, the lowest improvement being -0.67 meters or -2’2.37” and biggest improvement being 2.663 meters or 8’8.81”. There are thirty-one high school marks for the Decathlon shot put that were not found, due to the Decathlon's best high school mark not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
-0.6700 -0.3690 -0.2800  0.1181  0.2070  2.6630      31
```

Fig. 150. Summary of Decathlon shot put amount improved from high school.

4.5.3.8 Decathlon Discus

Seen in Figure 151, the discus improvement from high school by Decathlon spikes from –5 meter to no improvement with small groups higher than that range.

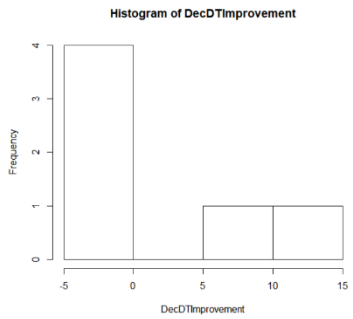


Fig. 151. Histogram of Decathlon discus improvement from high school.

Figure 152 shows that improvement is harder to gain in some events with the first quarter starting at –1.226 meters or 4’0.25” of improvement and the third quarter at 6.768 meters or 22’2.45” of improvement. The average high school improvement for the Decathlon discus is 2.74 meters or 8’11.87”, the lowest improvement being -3.836 meters or –12'7” and the biggest improvement being 14.529 meters or 47’8”. There are thirty-four high school marks for the Decathlon discus that were not found, due to the Decathlon's best high school mark not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
-3.836  -1.228  -1.228   2.740   6.768  14.529      34
```

Fig. 152. Summary of Decathlon discus improvement from high school.

4.6 Heptathlon

The Heptathlon dataset looks at high school events Heptathlon All-American's participated in. It contains six out of the seven events, as Javelin is uncommon event in high school track and field. The aspects analyzed in the Heptathlon dataset are the same as the All-American dataset, looking at the break down of each event’s high school times and marks and the improvement of each event from high school to college. Another aspect that will be analyzed that is different from the All-American dataset but same as the Decathlon dataset is how many Heptathlon athletes participated in each event in high school to find out which events done in high school are more likely to turn out an All-American as a Heptathlon athlete.

4.6.1 Events of Heptathlon in High School

The number of All-American's that participated in specific events in high school is a good way to find what high school athletes to recruit to become a Heptathlon athlete in college. In Wisconsin high school track and field, athletes are allowed to participate in four events maximum, with at most three of them being field or running events. The top four events that are participated in high school by the Heptathlon All-American athletes will be taken into consideration as the type of athletes that will be looked at as potential Heptathlon athletes in college. As seen in Figure 153 the top four events participated in from Heptathlon All-American's are Long Jump, 200-meter, 100-meter Hurdles, and High Jump. There are not many events that drop off but shot put is the clear event with the least amount.

```
HS_LJ_PR_in_Meters HS_200m_PR HS_100m_Hurdles_PR HS_HJ_PR_in_Meters HS_800m_PR HS_SP_PR_in_Meters
                25         24                23                20         15                10
```

Fig. 153. Summary of Heptathlon All-American's participation in events from high school.

4.6.2 Heptathlon High School Times by Event

This section will break down by event what the high school times and marks of the Heptathlon event are good based off the times and marks of the All-American's. This analysis shows histograms as a visual way to see where an average of Heptathlon athletes performed in high school, also joined with a summary showing the numbers to help better understand the results the histogram is showing.

4.6.2.1 Heptathlon 200-meter

Looking at Figure 154, the 200-meter times from high school by Heptathlons, it can be seen there is a wide variety of times from 25 seconds to 30 seconds.

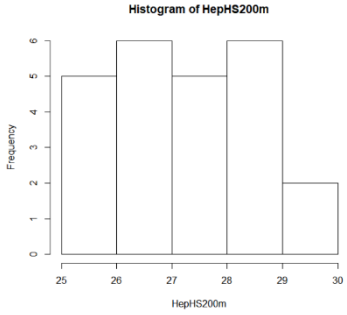


Fig. 154. Histogram of Heptathlon 200-meter times from high school.

The numbers in Figure 155 start with the first quarter at 26.5 seconds and the third quarter at 28.31 seconds. The average high school time for the Heptathlon 200-meter is 27.33 seconds, the slowest time being 29.94 seconds and the fastest time being 25.41 seconds. There are sixteen high school times for the Heptathlon 200-meter that were not found, due to the Heptathlon's best high school time not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  25.41   26.50   27.34   27.33   28.31   29.94      16
```

Fig. 155. Summary of Heptathlon 200-meter times from high school.

4.6.2.2 Heptathlon 800-meter

Figure 156 shows the 800-meter times from high school by Heptathlon vary widely with times from 130 seconds to 190 seconds.

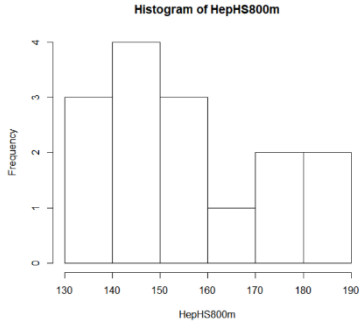


Fig. 156. Histogram of Heptathlon 800-meter times from high school.

Figure 157 visual shows the numbers match with the above graph with the first quarter starting at 2:21.6 minutes and the third quarter at 2:51.4 minutes. The average high school time for the Heptathlon 800-meter is 2:36.1 minutes, the slowest time being 3:06.3 minutes and the fastest time being 2:19.2 minutes. There are twenty-five high school times for the Heptathlon 800-meter that were not found due to the Heptathlon's best high school time not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  139.2   141.6   152.2   156.1   171.4   186.3      25
```

Fig. 157. Summary of Heptathlon 800-meter times from high school.

4.6.2.3 Heptathlon 100-meter Hurdles

Shown in Figure 158, the 100-meter hurdles times from high school by Heptathlon have several spikes from 15 seconds to 15.5 seconds and 16 seconds to 16.5 seconds with more amounts faster, slower, and in between the two ranges.

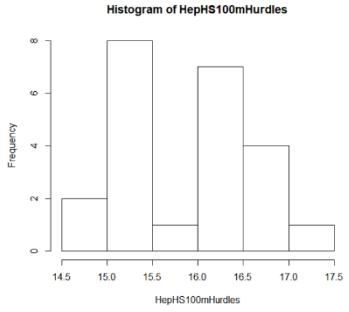


Fig. 158. Histogram of Heptathlon 100-meter hurdles times from high school.

Figure 159 shows data from Figure 158 with the first quarter starting at 15.26 seconds and the third quarter at 16.44 seconds. The average high school time for the Heptathlon 100-meter hurdles is 15.87 seconds, the slowest time being 17.21 seconds and the fastest time being 14.79 seconds. There are seventeen high school times for the Heptathlon 100-meter hurdles that were not found due to the Heptathlon's best high school time not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  14.79   15.26   16.07   15.87   16.44   17.21      17
```

Fig. 159. Summary of Heptathlon 100-meter hurdles times from high school.

4.6.2.4 Heptathlon Long Jump

The visual in Figure 160 shows long jump marks from high school by Heptathlon's with a spike from 5 meters to 5.5 meters, with more that are farther and shorter than the range.

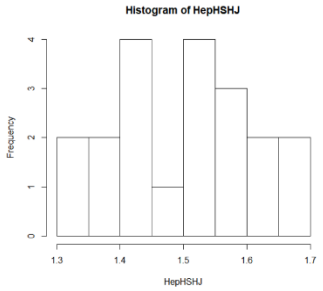


Fig. 160. Histogram of Heptathlon long jump times from high school.

Looking at Figure 161 it can be seen that the numbers show the first quarter starting at 4.718 meters or 15'5.75" and the third quarter at 5.327 meters or 17'5.75". The average high school mark for the Heptathlon long jump is 5.045 meters or 16'6.62", the shortest mark being 4.267 meters or 14'0" and the farthest mark being 5.664 meters or 18'7". There are fifteen high school marks for the Heptathlon long jump that were not found due to the Heptathlon's best high school mark not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  4.267   4.718   5.045   5.327   5.664      15
```

Fig. 161. Summary of Heptathlon long jump times from high school.

4.6.2.5 Heptathlon High Jump

As seen in Figure 162, the long jump marks from high school by Heptathlon has spikes from 1.4 meters to 1.45 meters and 1.5 meters to 1.55 meters, with more marks farther, shorter, and in between that range.

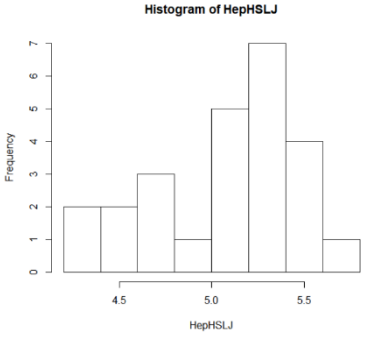


Fig. 162. Histogram of Heptathlon high jump times from high school.

In Figure 163 the numbers show the first quarter starting at 1.409 meters or 4'7.5" and the third quarter at 1.581 meters or 5'2.25". The average high school mark for the Heptathlon high jump is 1.506 meters or 4'11.29", the shortest mark being 1.32 meters or 4'4" and the highest mark being 1.676 meters or 5'6". There are twenty high school marks for the Heptathlon high jump that were not found, due to the Heptathlon's best high school mark not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  1.320   1.409   1.524   1.506   1.581   1.676      20
```

Fig. 163. Summary of Heptathlon high jump times from high school.

4.6.2.6 Heptathlon Shot Put

The shot-put marks from high school by Heptathlon are shown in Figure 164 and gradually build as the distance increases.

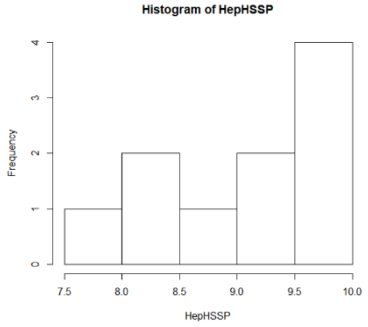


Fig. 164. Histogram of Heptathlon shot-put times from high school.

The numbers in Figure 165 illustrate what was shown above with the first quarter starting at 8.46 meters or 27′9.07″ and the third quarter at 9.823 meters or 32′2.73″. The average high school mark for the Heptathlon shot-put is 9.119 meters or 29′11″, the shortest mark being 7.924 meters or 26′0″ and farthest being 9.994 meters or 32′9.5″. There are thirty high school marks for the Heptathlon high jump that were not found due to the Heptathlon's best high school mark not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
  7.924   8.460   9.182   9.119   9.823   9.994      30
```

Fig. 165. Summary of Heptathlon shot-put times from high school.

4.6.3 Heptathlon High School PR vs College PR

Another aspect to look at for the Heptathlon's is the amount they improved from their high school PR. In this section there will be a breakdown between the college PR and the high school PR, looking at the average improvement in college to understand how much athletes might improve in each event.

4.6.3.1 Heptathlon 200-meter

Displayed in Figure 166, the 200-meter improvement from high school by Heptathlon, there is a spike of improvement from 0.5 second to 1 second, with data outside that range.

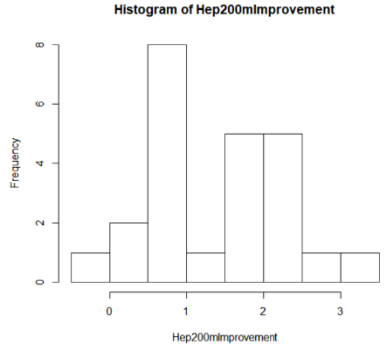


Fig. 166. Histogram of Heptathlon 200-meter amount improved from high school.

Figure 167 describes the first quarter starting at 0.59 seconds of improvement and the third quarter at 2.328 seconds of improvement. The average high school improvement for the Heptathlon 200-meter is 1.399 seconds, the lowest improvement being -0.27 seconds and the biggest improvement being 3.14 seconds. There are sixteen high school times for the Heptathlon 200-meter that were not found, due to the Heptathlon's best high school time not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
-0.270   0.590   1.540   1.399   2.328   3.140      16
```

Fig. 167. Summary of Heptathlon 200-meter amount improved from high school.

4.6.3.2 Heptathlon 800-meter

The 800-meter improvement from high school by Heptathlon in Figure 168 shows most of the improvement from 0 seconds improvement to 10 seconds, with a smaller amount higher than that range.

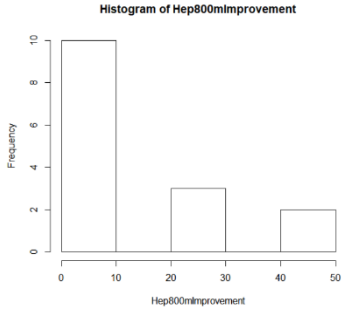


Fig. 168. Histogram of Heptathlon 800-meter amount improved from high school.

Figure 169 matches what is seen above with the first quarter starting at 3.15 seconds of improvement and the third quarter at 25 seconds of improvement. The average high school improvement for the Heptathlon 800-meter is 13.67 seconds, the lowest improvement being 1.1 seconds and the biggest improvement being 41.3 seconds. There are twenty-five high school times for the Heptathlon 800-meter that were not found, due to the Heptathlon's best high school time not being found.

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
   1.10    3.15    7.50   13.67   25.00   41.30      25
```

Fig. 169. Summary of Heptathlon 800-meter amount improved from high school.

4.6.3.3 Heptathlon 100-meter Hurdles

The visual seen in Figure 170, the 100-meter hurdles improvement from high school by Heptathlon, there is an increase in the amount as the improvement increases.

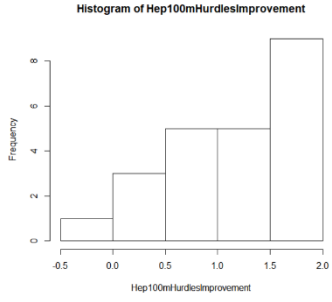


Fig. 170. Histogram of Heptathlon 100-meter hurdles amount improved from high school.

The numbers in Figure 171 agree with Figure 170, as the

first quarter starts at 0.83 seconds of improvement and the third quarter at 1.725 seconds of improvement. The average high school improvement for the Heptathlon 100-meter hurdles is 1.196 seconds, the lowest improvement being -0.23 seconds, and the biggest improvement being 1.99 seconds. There are seventeen high school times for the Heptathlon 100-meter hurdles that were not found due to the Heptathlon's best high school time not being found.

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
-0.230	0.830	1.190	1.196	1.725	1.990	17

Fig. 171. Summary of Heptathlon 100-meter hurdles amount improved from high school.

4.6.3.4 Heptathlon Long Jump

Seen in Figure 172, the long jump improvement from high school by Heptathlon, there is a spike from 0.2 meters to 0.4 meters, with more groups higher and lower than the range.

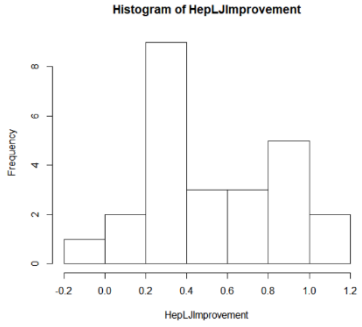


Fig. 172. Histogram of Heptathlon long jump amount improved from high school.

In Figure 173 the numbers match the graph above with the first quarter starting at 0.309 meters or 1′0″ of improvement and the third quarter at 0.827 meters or 2′8.55″ of improvement. The average high school improvement for the Heptathlon long jump is 0.5414 meters or 1′9.31″, the lowest improvement being -0.065 meters or –2.55 inches and the biggest improvement being 1.177 meters or 3′10.33″. There are fifteen high school marks for the Heptathlon long jump that were not found due to the Heptathlon's best high school mark not being found.

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
-0.0650	0.3090	0.4960	0.5414	0.8270	1.1770	15

Fig. 173. Summary of Heptathlon long jump amount improved from high school.

4.6.3.5 Heptathlon High Jump

Figure 174, the high jump improvement from high school by Heptathlon, there is a variety of improvements from no improvement to 0.25 meters.

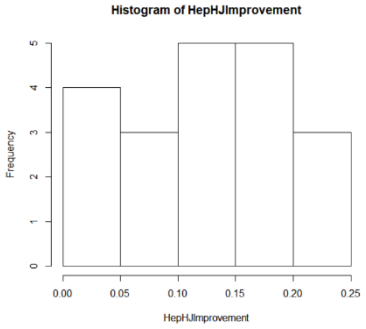


Fig. 174. Histogram of Heptathlon high jump amount improved from high school.

In Figure 175 the first quarter starts at 0.062 meters or 2.44 inches of improvement and the third quarter at 0.171 meters or 5.73 inches of improvement. The average high school improvement for the Heptathlon high jump is 0.1177 meters or 4.63 inches, the lowest improvement being 0 meters and most improvement being 0.22 meters or 8.66 inches. There are twenty high school marks for the Heptathlon high jump that were not found, due to the Heptathlon's best high school mark not being found.

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
0.0000	0.0620	0.1310	0.1177	0.1710	0.2200	20

Fig. 175. Summary of Heptathlon high jump amount improved from high school.

4.6.3.6 Heptathlon Shot Put

The shot-put improvement from high school by Heptathlons shown in Figure 176 illustrates a range of improvements, with a spike from 2 meters to 2.5 meters.

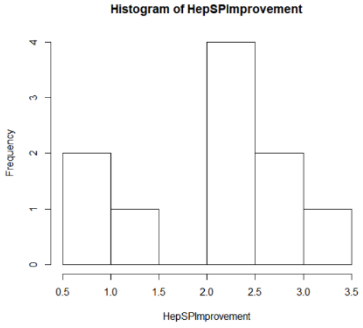


Fig. 176. Histogram of Heptathlon shot-put amount improved from high school.

Looking at Figure 177 the numbers show the first quarter starting at 1.591 meters or 5′2.63″ of improvement and the third quarter at 2.63 meters or 8′7.54″ of improvement. The average high school improvement for the Heptathlon shot-put is 2.01 meters or 6′7.13″, the lowest improvement being 0.517 meters or 1′8.35″ and the biggest improvement being 3.352 meters or 11′0″. There are thirty high school marks for the Heptathlon shot-put that were not found, due to the Heptathlon's best high school mark not being found.

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
0.517	1.591	2.178	2.010	2.630	3.352	30

Fig. 177. Summary of Heptathlon shot-put amount improved from high school.

5 Conclusion

The All-American recruitment project brought insight into the where desirable athletes are from, what high school times and marks are good for each event based off college marks, and estimated improvement of the athletes from high school to college by event. Wisconsin is the state that has had the most All-American's since 2016 across all three datasets, Decathlon, Heptathlon, and the rest of the All-American. There are other states and regions, such as the New England region, that had a lot of All-American's and would be good spots to recruit track and field athletes for Division III. Each event showed the outliers from comparing the top two times and marks for each All-American from high school, but the majority of athletes fell close together. Using a summary to find the first quarter to third quarter gave a range of times and marks for each event, which can now be used to recruit high level athletes for Division III track and field in college. The improvements from event to event varied, with throwing events showing a large spread with many students not improving from high school but others improving by great amounts. The running events showed a more consistent improvement compared to other events, but as expected still consisted of some outliers. These times and marks were compared to get an understanding of average athlete improvement in college on average per event. These histograms and data charts can be used for recruiting in correlation with the range given for high school events to see how much athletes will possibly improve from high school. The Decathlon and Heptathlon datasets investigated similar topics but also with the added measure of looking to see how many All-American's participated in each event in high school that was also a part of the multi events. The Decathlon analysis found that the top four events that were competed in from high school most frequently were High Jump,110-meter Hurdles, Long Jump, and 400-meter. The top four events competed in for the Heptathlon All-Americans in high school were Long Jump, 200-meter, 100-meter Hurdles, and High Jump. Learning how many multis competed in each event in high school helps to see what athletes in high school have a potential to be a good multi in college, also an important parameter for recruitment. It is important to note that the smaller number of data points made for more variations within the breakdown of each event in the Heptathlon and Decathlon datasets. All the information for these datasets was collected by hand, using TFRRS.org to obtain college information and Athletic.net for high school information including minimal personal data. The additional links below of the college track and field rosters were also used find out which high school and state an All-American was from. This project is intended to give the UWRF an edge in recruiting for the coming years to help build the program to new heights.

6 Acknowledgments

I would like to thank Andrew Eggerth, the head coach at UWRF, for bringing this project to my attention. Also, for sitting down with me to work out the details of the project, from the information I should collect about the All-American's to where I could look to find the data needed to complete this project. Mr. Eggerth also went through what events should or should not be in the project, and which events could be compared to other high school events. As an Alumni of the UWRF track and field team, I am grateful for the opportunity to give back to the team. Lastly, I am appreciative of the experience gained by completing this project.

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