

MatStats Episode 26

Wednesday November 15th, 2023, 3PM EST

Rock 'N' Roll High School (Part 1)

Episode
26-1

The boys at MatStats welcome NWCA Deputy Director, Dr. Jackie Paquette, to analyze and discuss High School wrestling participation numbers in current and recent years. Where we are, where we were, and how we got here. The bottom line is the high school numbers are rock 'n' rollin'.



I Feel Like A Number

Episode
26-2

To the fans I'm just a drone
To my wireless service I'm just another phone
I'm just a statistic on a bout sheet
To the teachers I'm just another child
To the IRS I'm just another file
I'm just a correlation on the stat sheet

I feel like a number
I feel like a number
I'm not a number, I'm not a number

Jenny, Jenny had perhaps the most famous phone number in American history.

867-5309

Episode
26-3

MatStats, MatStats, who can I turn to?
You give me something I could hold on to
I know you think I'm like the others before
Who saw your name and number on the wall.

.....

867-5309

Mat-Stats

Mat-Stats

Are there any disclaimers MatStats needs to let everyone know about their shows?

The Opinions Expressed on this show do not necessarily reflect any policies or opinions of the NWCA. Also, the MatStats guys do not always agree on all things discussed on their shows.

Episode
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- MatStats is a subsidiary of the NWCA but is a separate entity that voices its own opinions on its statistical analysis.
 - MatStats three hosts, Gormley, Bryant, and Hazard are all equally responsible for all the good outcomes. Gormley for the bad feedback.
- Gormley writes the Power Points and selects the topics. Gormley uses the term MatStats often, but many times it is Gormley's opinion alone.
- Gormley does the stats work and then the three hosts & occasionally guests brainstorm about Gormley's findings and ideas.
 - MatStats is designed to have educated thoughts and opinions to help the world's oldest and greatest sport.
- Wrestling is all about settling disagreements. The hosts are too old to settle these disagreements on the mat.
- Sometimes we agree, sometimes we disagree. It makes the world go round.

As of 11/9/23, there are 500 men & women's wrestling teams in the NCAA & NAIA.

Episode
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Category	Men	Women	Total	Most ever Men's Teams	Year	Most Ever Total Teams	Years
NCAA D1	81	4	85	146	1982	146	1982
NCAA D2	73	32	105	73	2023	105	2023
NCAA D3	129	61	190	149	1982	190	2023
NCAA	283	97	380	363*	1982	380	2023
NAIA	75	45	120			120	2023
4 Year	358	142	500			500	2023

* - Note the NCAA reports 393 men's teams in 1972, but they do not know how many were club teams.

Does MatStats have the updated NCAA numbers for 2023 for total male wrestlers?

Since the NCAA kept comprehensive records in 1981-82, the total male wrestlers in 2023 rank #5. We had 30 fewer wrestlers in 2023 from 2022.

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Rank	Year	Men
1	1985	8,572
2	1984	8,417
3	1986	8,401
4	2022	8,338
5	2023	8,308

Can MatStats explain what this show is about and why we are doing it?

The state of high school wrestling is strong. You can say is it Rock 'N' Rollin'.

Episode
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- MatStats has done many recent shows on collegiate and international wrestling.
- It is November and the start of the high school wrestling season.
- It is only fitting that we do an episode on where high school wrestling is, where it was, and how we got here.
- MatStats did such a deep dive to get to the bottom of this that it requires two episodes.

Could MatStats have Dr. Paquette explain to the viewers what the NWCA OPC numbers are?

MatStats is happy to have Dr. Jackie Paquette as our guest and have her help educate our viewers on High School wrestling numbers.

Episode
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- The numbers MatStats uses for high school wrestlers comes from the NWCA OPC state by state numbers.
- If a state does not use the OPC, MatStats used the National Federation of High School (NFHS) numbers.
- MatStats has the current NWCA expert on this on the show - Dr. Jackie Paquette. We will let her explain the OPC to the viewers.
- MatStats wants to give a shout out to Pat Tocci that oversaw the OPC and many other things with the NWCA for about 20 years. Thanks for all you have done for our sport.

We have more boys, girls, and total wrestlers in 2023 than we have since 2013.

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High	School	Wrestlers	50 States
Year	Boys	Girls	Total
2013	270,163	8,773	278,936
2014	271,532	8,968	280,500
2015	260,605	11,293	271,898
2016	252,356	13,533	265,889
2017	245,439	14,434	259,873
2018	246,238	16,800	263,038
2019	250,218	20,598	270,816
2020	265,157	25,023	290,180
2021	165,497	18,679	184,176
2022	246,562	30,906	277,468
2023	283,985	48,658	332,643

Numbers in 2021
Are down due to the
Events of Covid.

How big is the 332,643 number of current HS wrestlers in 2023?

The current HS wrestling population would be the 57th largest city in America. Larger than the population of St Louis (286K - where the NCAA Men's D1 tourney has been often).

Episode
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- For every 1,000 people in America, there is 1 current high school wrestler.
- So, when the Vols play the Dawgs on 11/18/23 at Neyland, there will be about 102 current high school wrestlers.
- Of course, these numbers will be skewed in many situations. If the NCAA Men's D1 championships have 20K spectators at the finals, there will be more than 20 current high school wrestlers in the arena.

Jauan Jennings makes Hail Mary catch to beat the Dawgs Between the Hedges on 10/1/16.

Where does boys wrestling rank with participation compared to all high school sports?

According to the NFHS, boys wrestling participation ranks 6th of all sports.

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Boys Rank	NFHS 2023 Sport
1	Football
2	Track Outdoor
3	Basketball
4	Baseball
5	Soccer
6	Wrestling

Where does wrestling rank in girl's participation in HS sports in 2023?

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According to the NFHS, girls wrestling ranked #14 in 2023 with number of participants.

Women's HS
Wrestling should
Pass Field Hockey
In 2024.

Girls Rank	NFHS Sport
1	Track Outdoor
2	Volleyball
3	Soccer
4	Basketball
5	Softball
6	Cross Country
7	Tennis
8	Spirit Competitive
9	Swimming
10	Lacrosse
11	Golf
12	Track Indoor
13	Field Hockey
14	Wrestling

What states had the most boys & girls HS wrestlers in 2023?

CA had the most boys and girls HS wrestlers in 2023. Here are the top 10 in each sex.

Episode
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	Boys		Girls	
Rank	State	Number	State	Number
1	CA	26,607	CA	6,870
2	IL	14,745	TX	4,534
3	NY	14,627	WA	2,470
4	TX	12,785	IA	2,404
5	OH	12,241	MO	2,144
6	MI	10,718	IL	2,142
7	FL	10,602	KS	1,929
8	GA	10,564	OH	1,287
9	PA	10,562	AZ	1,263
10	NJ	10,172	UT	1,254

What state has the most NCAA & NAIA wrestling teams? How many HS wrestlers are there per college teams in those states?

Episode
26-14

PA has the most NCAA & NAIA teams (54).

CA is by far
The most
Populated
State in
The USA

States	most	teams	11/3/23
Rank	State	NCAA & NAIA Teams	HS Wrestlers/college team
1	PA	54	207
2	IA	34	283
3	OH	31	436
4	NY	25	627
5	IL	24	701
5	MO	24	373
7	MI	21	557
8	VA	19	447
8	WI	19	439
10	NC	18	604
11	KS	15	453
12	CA	14	2391
	mean	9.6	668

Let's begin our analysis of the data the NWCA provided to MatStats on HS wrestling.

Episode
26-15

- Gorms will lead the deep dive into the stats on how we got where we are in 2023.
- A statistician needs to analyze the data and see where it leads and what it tells us.
- You do not always know what you will find.
- Let's start and see what correlations there are between the number of high school wrestlers and other pertinent data.
- Remember what Gorms has said repeatedly on past shows, "Correlation does not prove causation."

A quick primer on stats and correlation

Episode
26-16

- In statistics, correlation is any statistical relationship between two random variables.
- Correlation refers to the degree the two variables are linearly related.
- +1 is the strongest positive relationship.
- 0 is no relationship
- -1 is a strong negative relationship.
- Note correlation does not prove causation. Gorms is here to help explain this.

In business terms, boys high school wrestling is a mature industry and girls are a growth industry.

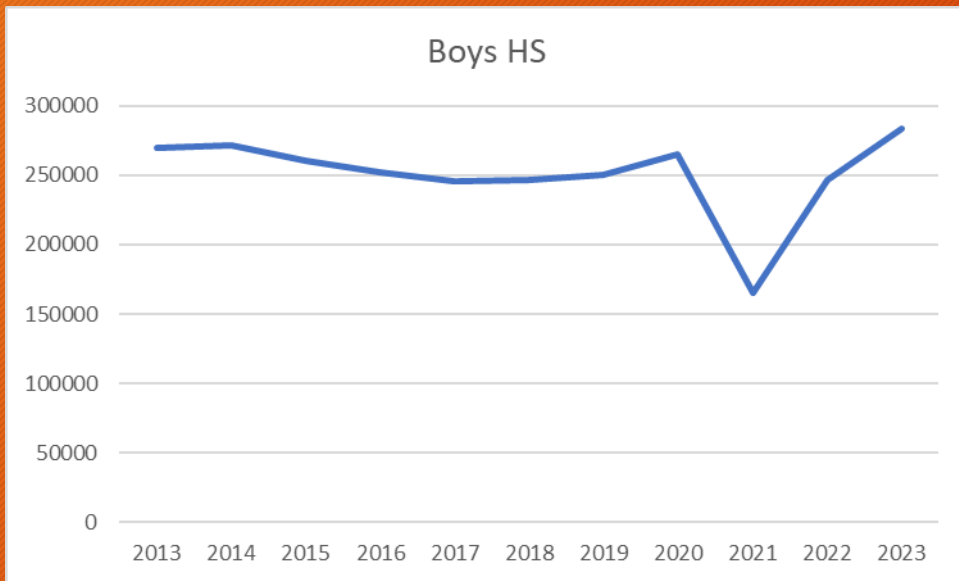
Episode
26-17

- This is important to consider. We need to evaluate them differently at times. There is much more data and history in boys wrestling, so more analysis can be done with greater reliability.
- Mature industries usually do not experience the growth of a growth industry.
- Mature companies have an easier time obtaining financing or in our case support and interest from stakeholders.
- On the flip side, sell the growth and possibilities in girls HS wrestling and help empower them. A Saturday jogger is much more likely to vastly improve his 5K time than a world class runner.
- Everyone should have the opportunity to participate in the world's oldest and greatest sport. Ironically, women are new to wrestling but are now as important and men in our beloved sport.

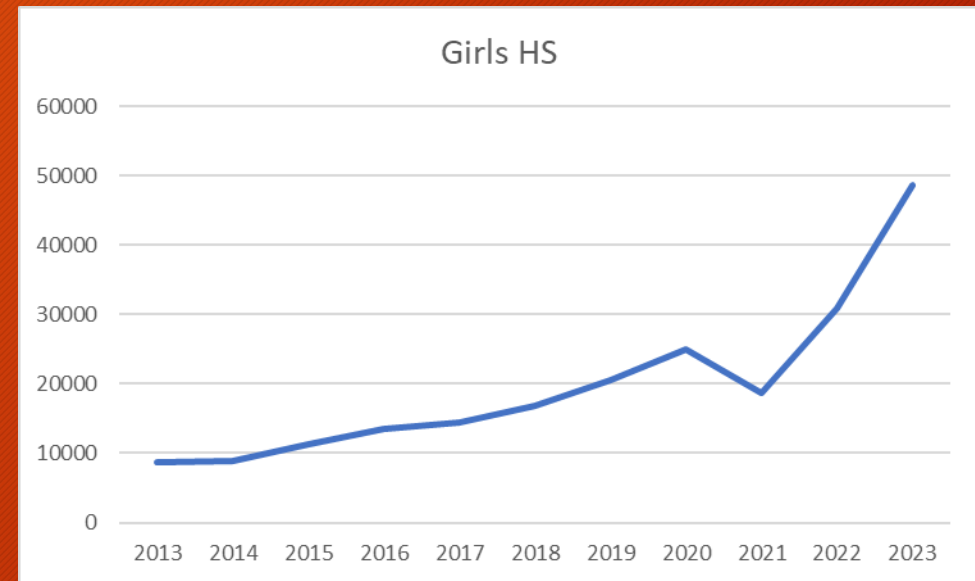
Can MatStats provide graphs of the HS numbers to help viewers see the difference between Mature and growth aspects of boys and girls?

Mature (Boys) vs Growth (Girls)

Episode
26-18



Mature Industry



Growth Industry

Is there a correlation between the number of wrestlers in each state and the population of the state?

There is a **very strong correlation (+0.91)** between the population of each state and the number of wrestlers in that state.

Episode
26-19

- There is a very strong correlation between the number of total high school wrestlers in each state and the population of each state.
- Corr Pop & HS wr **+0.91 Very strong**
- To put it in layman's terms the more populated states have more high school wrestlers.

Can MatStats show the viewers the correlation between population (2022) and the number of boys and girls HS wrestlers (2023).

There is a **strong correlation (+0.89 & +0.81)** between both the number of boys & girls HS wrestlers.

Episode
26-20

- Corr pop & boys HS wrest +0.89 **Very Strong**
- Corr pop & girls HS wrest +0.81 **Very Strong**

- **Population is a strong determination of the number of both boys and girls wrestling in each state.**

Is there a correlation between the number of men's NCAA & NAIA teams with the Number of women's NCAA & NAIA teams in each state in 2023?

There is a **strong correlation (+0.86)** to a state having men's and women's NCAA & NAIA teams.

Episode
26-21

- There is a very strong correlation between the number of men & women's NCAA & NAIA teams in each state.
- corr men & women's teams **+0.86 very strong**
- This means a state with men's teams is very likely to have women's teams and vice versa.

Is there a correlation between the number of HS wrestlers and college teams in each state in 2023?

There is a **moderate correlation (+0.53 & +0.38)** between the number of high school wrestlers and the number of NCAA & NAIA teams in each state.

Episode
26-22

There is a moderate correlation between the number of boys/girls wrestling in high school in 2023 and the number of men/women's college teams in their respective states.

Corr Boys & Teams	+0.53	Moderate
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Corr Girls & Teams	+0.38	Moderate
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We do not know which caused which (chicken or egg), but it does suggest moderate causation.

Is there a correlation between the population of each state and the number of college teams?

There is a **moderate correlation (+0.33)** between the population of each state and the number of NCAA & NAIA teams in each state.

Episode
26-23

- There is a moderate correlation between the state's population and the number of NCAA & NAIA teams in each state in 2023.
- Corr pop & # teams **0.33 Moderate**

Is there a correlation between the population in each state (2022) and the number of men's college teams added from 2013 to 2023?

The is a slightly **moderate correlation (+0.37)** between the population of each state and the number of men's NCAA & NAIA teams added from 2013 to 2023.

Episode
26-24

- There is a moderate positive correlation between the population in each state in 2022 and the men's teams added from 2013 to 2023 in each state.
- corr pop & mens teams added 13-23 **+0.37 Very Moderate Correlation**

Is there a correlation between the growth rate in HS boys wrestling and state population growth?

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There is **NO correlation (-0.18)** between the growth rate of state's population and boys HS wrestling growth rate.

- There is no correlation between the boy's high school growth rate from 2013 to 2023 and the population increase in each state from 2010 to 2020.
- The boys HS growth rate overall was +5.12% and the population of USA was +7.34%.
- corr mens growth % & pop growth rate % **-0.18 No correlation**
- It is random. States growing do not mean those states are growing the same rate as boys wrestling.
- It is a population in numbers not in growth rate.

Can MatStats show the viewers a chart with boys HS growth and population growth?

Here is a table showing the randomness of boys HS growth rate and states population growth.

Episode
26-26

Boy's growth % increase 2013 to 2023		State population growth % 2010 to 2020
Rank	State	Rank
1	AR	33
2	AL	25
3	ND	4
4	SD	14
5	HI	21
6	ID	2
7	KY	31
8	GA	12
9	TX	3
10	WY	42
MS	not enough wrestler to be included	

Is there a correlation between population and boy's growth rate in HS?

There is **NO correlation (-0.08)** between states population (2022) and boys HS growth rate (2013-23).

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26-27

- There is no correlation between the boy's growth rate from 2013 to 2023 and the population of each state.
- Corr growth % & Pop **-0.08 No Correlation**
- The growth rate is not correlated with the population. Once again it is a total population deal. Absolute numbers in population affect numbers in boys HS wrestling, not its growth rate.

Is there a correlation between the growth rate of HS boys wrestling (2013-23) and the number of girls wrestling in HS in each state.

There is **NO correlation (-0.12)** between the % of growth from HS boys (2013-23) and the number of girls wrestling in HS in each state.

Episode
26-28

- There is no correlation between the growth rate of high school boys from 2013 to 2023 and the number of high school girls wrestling in each state.
- corr men growth % and women wrestlers **-0.12 No Correlation**
- **This means we can not say a growth in boys wrestling in HS has anything to do with the number of girls wrestling in that state.**

Is there a correlation between the growth in numbers of boys HS wrestlers and girl's growth in numbers in each state from 2013 to 2023?

There is **No correlation (-0.12)** between the increase in boys HS wrestlers in numbers and the increase in girls HS wrestlers in numbers in each state from 2013 to 2023.

Episode
26-29

- There is no correlation between the change in the number of boys high school wrestlers from 2013 to 2023 and the number of girl high school wrestlers from 2013 to 2023.
- corr men growth # and women growth # **-0.12 No correlation**
- The growth of the numbers of boys and girls in each state have no correlation. It is random.

The number of college teams **do not cause** **(-0.14)** a growth rate in boys HS wrestling.

Episode
26-30

- There is no correlation between the 10-year OPC growth rate in each state and the number of NCAA & NAIA wrestling teams.
- corr 10-year opc growth % with 4-year colleges men **-0.14 No Correlation**
- This means there is no connection between the number of men's NCAA & NAIA teams in 2023 and the growth of HS boys in each state. College teams do not result in more boys wrestling in that state.

Is there a correlation between NCAA & NAIA teams added from 2013-23 and the boys HS growth rate from 2013 to 2023?

There is **No correlation (-0.10)** between the number of NCAA & NAIA teams added from 2013-23 and the boys HS growth rate from 2013-23.

Episode
26-31

- There is no correlation between the boys HS growth rate from 2013 to 2023 and the number of men's teams added in NCAA & NAIA from 2013 to 2023 in each state.
- corr mens growth rate % & mens teams added **-0.10 No correlation**
- **Colleges adding men's teams have no effect on growth of HS boys wrestling and vice versa.**

Here is the summary of the data analysis for the state-by-state project for HS wrestling.

Episode
26-32

- There are 5 categories for the data that were analyzed.
 - 1) Strong positive correlations.
 - 2) Moderate positive correlations.
 - 3) No correlations.
 - 4) Moderate negative correlations.
 - 5) Strong negative correlations.

What are the categories with a strong positive correlation?

Episode
26-33

MatStats found 4 strong positive correlations with the following variables.

- 1) The number of men's and women's college wrestling teams (+0.86).
- 2) Number of HS wrestlers and the population (+0.91).
 - 3) Boys HS wrestlers & state population (+0.89)
 - 4) Girls HS wrestlers & state population (+0.81)

• POPULATION IS A HUGE FACTOR

What are the variables with a moderate positive correlation?

Episode
26-34

MatStats found 4 moderate positive correlations with the following variables.

- 1) Number of boys HS wrestlers & number of NCAA & NAIA men's college teams in each state (+0.53).
- 2) Number of girls HS wrestlers & number of NCAA & NAIA women's college teams (+0.38).
- 3) State population & number of NCAA & NAIA teams (+0.33).
- 4) State population & number of men's teams added 2013 to 2023 (+0.37).

**NUMBER OF HS WRESTLERS & COLLEGE TEAMS ARE MODERATLY CORRELATED.
SO IS STATE POPULATION AND COLLEGE TEAMS.**

What are the variables MatStats found with no correlation?

MatStats found 6 examples of variables with no correlation.

Episode
26-35

- 1) Growth % HS boys & number of girls in each state (-0.12).
- 2) Increase (change) in the number of HS boys & increase (change) in the number of HS girls from 2013-23 (-0.12).
- 3) HS boys' growth rate 2013-23 & number men's college teams (-0.14).
 - 4) State growth rate & boys HS growth rate (-0.18).
 - 5) State population & boys HS growth rate (-0.08).
- 6) Men's college teams added & HS boy's growth rate (-0.10).

THERE ARE MANY VARIABLES WITH NO CORRELATION. IT LEADS MATSTATS TO BELIEVE THERE IS SOMETHING ELSE CONTRIBUTING TO THE GROWTH OF HS WRESTLING IN THE USA.

What are the variables with a moderate negative correlation?

MatStats found no variables with a moderate negative correlation.

Episode
26-36

- **No Variables found with a moderate negative correlation.**

OF ALL THE VARIABLES MATSTATS RAN CORRELATIONS FOR, NONE OF THEM SHOW AN ADVERSE EFFECT ON HS WRESTLING.

MatStats found no variables with a strong negative correlation.

Episode
26-37

- MatStats found no variables with a strong negative correlation.
- To help the viewers understand an example of negative correlation, as temperatures go up people wear less clothes.

MatStats has found no correlations for any variable and the growth of HS wrestling.

Episode
26-38

- We have found the reasons some states have more than others with strong correlations - Population.
- On slide #26-15, Gorms reminds the viewers that correlation does not prove causation, but it is safe to say that this is a correlation with meat on its bones.
- An example that does not is some guy wearing a Crimson Tide shirt on Saturdays Down South is correlated with Bama winning. That is because they almost always win, and he always wears that shirt.
- MatStats could find no variables with correlation to growth in the sport.

What is the biggest take away for this show?

I feel like a number!

Episode
26-39

- The more people, the more wrestlers.
- Wrestling needs to grow the sport on all levels.
- In Business school we used to talk about bottoms-up forecasting. It is looking granularly at what makes a business grow. Start at the bottom.
- The earlier we start an option for kids to wrestle, the more we will have in HS and thereby the better option for colleges to add wrestling.
- **Many schools are enrollment driven and they need a reason to add wrestling. They will make sure there are enough HS wrestlers to provide a college team and add revenue to the school's bottom line.**
 - **CA TAKE NOTE**

MatStats finds it necessary to continue its investigation on HS wrestling to find trends.

Episode
26-40

- Dr. Paquette and the NWCA has provided Gorms with data from recent surveys from HS state wrestling organizations. Moyer made a great decision bringing Dr. J into the NWCA. This research might not have been possible without her.
- It is a vast amount of data that MatStats has investigated.
- It is so much data it requires a Part 2 on this topic.
- MatStats will discuss these trends on the next show.
- This will show us if there are reasons for growth in certain states and what couple be replicated to increase the chances of more growth in HS wrestling.

Episode 26 MatKevin's Notes #1

Episode
26-41

- 1) As of 11/9/23, we have 500 wrestling teams in the NCAA & NAIA. The most ever.
- 2) In 2023 the NCAA men had 8,308 wrestlers, the 5th highest ever.
- 3) A huge shout out to Dr. Jackie Paquette for her help on this show.
- 4) In the last 10 years (except Covid years) there has been a big jump in girls HS wrestlers and boys had a nice jump in 2023.
- 5) In 2023, boys HS wrestling ranks 6th in participation, girls 14th.

Episode 26 MatKevin's Notes #2

Episode
26-42

- 6) CA ranks 1st in the numbers of boys & girls HS wrestlers. Hazard quiz - What was the first state to sanction a girls tournament? JB Bonus Question: Who was the first champ?
- 7) PA has the most colleges with NCAA & NAIA wrestling teams (54). CA has the availability to add many more college teams.
- 8) Girls wrestling is in growth mode, boys are a 'mature' sport, but had nice growth in 2023.
- 9) Strong correlation between state population and number of HS wrestlers.
- 10) Tune in next month for the conclusion of this topic.

What is the topic next month (Wednesday 12/20/23 3PM EST)?

Rock 'N' Roll High School Part 2

Episode
26-43

- Tune In Next Month
 - Same Mat Time
 - Same Mat Channel
- Next months show will continue to investigate HS wrestling.
- MatStats will discuss its findings based on HS surveys from the NWCA.
 - Another example of how the NWCA is helping wrestling.