

# NCAA Women's Division III Advanced Stats Review

## Introduction

This document will review which factors contributed the most to scoring efficiency(points per possession) as well as other metrics and how they are correlated. Some takeaways from this document will be a 2019/2020 view of each of the Four Factors and how they affected winning. Additionally, a rubric for analyzing and understanding the league averages for each metric is included in the 2019/2020 Cheat Sheet.

When reviewing the following data it is important to keep in mind that negative correlations are just as important as positive ones. The primary difference being that the goal with negative correlations is to avoid them while the goal with positive correlations is to focus on them. For example, turnover rate has a negative correlation with points per possession(avoid TOs) while EFG% has a strong positive correlation. Additionally, by definition, highly correlated data like this is very often predictive in value, especially when used in context by subject matter experts(coaches). In other words, high points per shot from 2 are predictive of offensive EFG metrics which are predictive of high per possession scoring rates which are predictive of winning games.

## Other Resources

Four Factors: [www.pivotanalysis.com/post/what-are-four-factors-basketball](http://www.pivotanalysis.com/post/what-are-four-factors-basketball)

Offensive/Defensive Ratings: [www.pivotanalysis.com/post/offensive-and-defensive-ratings](http://www.pivotanalysis.com/post/offensive-and-defensive-ratings)



## Overview of Correlations and Metrics

<b>Strong Positive (70%)</b>	Positively correlated factors move in the same direction. For example, an increase in Points Per 100 Possessions correlates strongly with an increase in Net Rating.
<b>Moderate Positive (50%)</b>	
<b>Weak Positive (30%)</b>	
<b>No Correlation (0%)</b>	White areas have little to no correlation with the identified metric.
<b>Weak Negative (-30%)</b>	Negatively correlated factors move in the opposite direction. For example, an increase in Opponent Points Per 100 Possessions correlates strongly with a decrease in Net Rating.
<b>Moderate Negative (-50%)</b>	
<b>Strong Negative (-70%)</b>	
<b>Categories</b>	<b>Description</b>
PPP	Points per possession - Scoring Efficiency
EFG	Effective Field Goal Percentage - Points per shot without free throws
PPS w/FT	Point per shot with Free Throws - True shooting percentage
FG%	Field goal percentage
2pt PPS	Points per shot on 2 point field goal attempts - 2 point field goal percentage
A/TO	Assist to Turnover Ratio
3pt PPS	Points per shot on 3 point field goal attempts - 3 point field goal percentage
FT%	Free throw percentage
ORR	Offensive Rebound Rate - Ratio of missed shots that result in an offensive rebound
FTR	Free Throw Rate - Ratio of made FTs to FGAs
3PAR	3 point attempt rate - Proportion of FGAs that are taken from 3
Assist%	Assist Percentage - Ratio of Assists to made field goals
Pace	# of Possessions per 40 minutes
TOV	Turnover Percentage - Percentage of possessions that end in a turnover



## High Value Metrics

*Overall Scoring Efficiency (per possession / per shot / EFG)*

D3 Women	PPP	EFG	2pt PPS	3pt PPS
PPP	100.00%	91.30%	86.97%	76.40%
EFG	91.30%	100.00%	94.94%	83.63%
PPS w/FT	89.52%	95.11%	90.36%	80.08%
FG%	89.01%	96.75%	95.96%	75.12%
2pt PPS	86.97%	94.94%	100.00%	63.04%
A/TO	85.29%	74.63%	71.03%	62.17%
3pt PPS	76.40%	83.63%	63.04%	100.00%
FT%	62.74%	55.46%	49.88%	50.23%
ORR	46.37%	27.66%	32.29%	16.01%
FTR	36.62%	31.09%	29.69%	27.65%
Asst%	23.78%	29.54%	26.14%	27.95%
3PAR	16.61%	20.64%	12.48%	24.10%
Pace	-11.83%	-13.91%	-9.95%	-17.72%
TOV	-74.97%	-54.31%	-49.95%	-47.51%

### Major Takeaways

The first takeaway from this table should be regarding the order of importance of the Four Factors (EFG, TOV, ORR, FTR) from Points Per Possession. The importance should be viewed by the absolute value of the correlation scores. In other words, TOV is very important but is inversely correlated with scoring (obviously). These factors encompass the results of an offensive or defensive strategy, as they capture per shot shooting effectiveness (EFG), percentage of possessions resulting in turnovers (TOV), percentage of missed shots that result in offensive rebounds (ORR), and the ability to draw and convert on fouls (FTR is the ratio of FTM to FGA).

The second major takeaway is understanding how the other metrics can increase EFG (always the most important factor for PPP). These include understanding how shot types (2pt PPS, 3pt PPS) correlate with EFG as well as the other Four Factors and Assist %. All takeaways can be applied to offensive strategies and inversely applied to defensive ones.



## Secondary Metrics

*Scoring Efficiency Contd. (per shot / shot type)*

<b>D3 Women</b>	<b>PPS w/FT</b>	<b>FG%</b>	<b>3PAR</b>	<b>FT%</b>
PPP	89.52%	89.01%	16.61%	62.74%
EFG	95.11%	96.75%	20.64%	55.46%
PPS w/FT	100.00%	93.05%	15.25%	63.49%
FG%	93.05%	100.00%	-3.43%	52.30%
2pt PPS	90.36%	95.96%	12.48%	49.88%
A/TO	65.56%	71.11%	20.49%	50.81%
3pt PPS	80.08%	75.12%	24.10%	50.23%
FT%	63.49%	52.30%	15.27%	100.00%
ORR	28.60%	36.63%	-31.26%	2.70%
FTR	58.91%	33.24%	-7.07%	50.31%
Asst%	23.58%	25.84%	15.78%	16.15%
3PAR	15.25%	-3.43%	100.00%	15.27%
Pace	-13.59%	-15.24%	9.79%	-19.62%
TOV	-50.04%	-48.96%	-26.78%	-50.59%



**Rebound, Free throw, turnover rates (Four Factors minus EFG)**

<b>D3 Women</b>	<b>ORR</b>	<b>FTR</b>	<b>TOV</b>
PPP	46.37%	36.62%	-74.97%
<b>EFG</b>	27.66%	31.09%	-54.31%
PPS w/FT	28.60%	58.91%	-50.04%
FG%	36.63%	33.24%	-48.96%
2pt PPS	32.29%	29.69%	-49.95%
A/TO	27.24%	6.51%	-81.61%
3pt PPS	16.01%	27.65%	-47.51%
FT%	2.70%	50.31%	-50.59%
<b>ORR</b>	<b>100.00%</b>	15.66%	-8.18%
<b>FTR</b>	15.66%	<b>100.00%</b>	-11.86%
Asst%	8.52%	-4.67%	-9.21%
3PAR	-31.26%	-7.07%	-26.78%
Pace	2.11%	-5.45%	6.00%
<b>TOV</b>	-8.18%	-11.86%	<b>100.00%</b>



**Pace / Assist Metrics (pace=possessions per 40 min)**

<b>D3 Women</b>	<b>Asst%</b>	<b>A/TO</b>	<b>Pace</b>
PPP	23.78%	85.29%	-11.83%
EFG	29.54%	74.63%	-13.91%
PPS w/FT	23.58%	65.56%	-13.59%
FG%	25.84%	71.11%	-15.24%
2pt PPS	26.14%	71.03%	-9.95%
A/TO	51.74%	100.00%	-9.56%
3pt PPS	27.95%	62.17%	-17.72%
FT%	16.15%	50.81%	-19.62%
ORR	8.52%	27.24%	2.11%
FTR	-4.67%	6.51%	-5.45%
Asst%	100.00%	51.74%	-1.95%
3PAR	15.78%	20.49%	9.79%
Pace	-1.95%	-9.56%	100.00%
TOV	-9.21%	-81.61%	6.00%

**Secondary Takeaways**

Once we get below points per possession and EFG, the correlations are less interesting due to the fact that the data does not exist for establishing factors that may be more relevant (detailed shot locations, defensive postures, etc). However, there are some takeaways that are valuable, such as the impact of 3PAR on rebound rates or rebound rates on FG%. Additionally, it is important to note those stats which have little to no correlation to their counterparts.

