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DSC 680 Project 1 - NBA Player Performance Metrics and Team Success Analysis

In [1]:
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# NBA Player Performance Metrics and Team Success Analysis

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error, r2_score
from sklearn.cluster import KMeans
from sklearn.preprocessing import StandardScaler

# Load the dataset
#file_path = '/Documents/Bellevue/NBA Analysis/NBA Analysis2023-2024 NBA Player Stats - Regular.csv'
nba_data = pd.read_csv('2023_2024_NBA_Player_Stats _Regular.csv', encoding='ISO-8859-1', delimiter=';')

# Display dataset structure
nba_data.head()
```

Out[1]:

	Rk	Player	Pos	Age	Tm	G	GS	MP	FG	FGA	...	FT%	ORB	DRB	TRB	AST	STL	BLK	TOV	PF	PTS
0	1	Precious Achiuwa	PF-C	24	TOT	74	18	21.9	3.2	6.3	...	0.616	2.6	4.0	6.6	1.3	0.6	0.9	1.1	1.9	7.6
1	1	Precious Achiuwa	C	24	TOR	25	0	17.5	3.1	6.8	...	0.571	2.0	3.4	5.4	1.8	0.6	0.5	1.2	1.6	7.7
2	1	Precious Achiuwa	PF	24	NYK	49	18	24.2	3.2	6.1	...	0.643	2.9	4.3	7.2	1.1	0.6	1.1	1.1	2.1	7.6
3	2	Bam Adebayo	C	26	MIA	71	71	34.0	7.5	14.3	...	0.755	2.2	8.1	10.4	3.9	1.1	0.9	2.3	2.2	19.3
4	3	Ochai Agbaji	SG	23	TOT	78	28	21.0	2.3	5.6	...	0.661	0.9	1.8	2.8	1.1	0.6	0.6	0.8	1.5	5.8

5 rows × 30 columns

In [2]:
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# Descriptive statistics
nba_data.describe(include='all')

# Correlation heatmap
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plt.figure(figsize=(12, 8))
correlation_matrix = nba_data.corr()
sns.heatmap(correlation_matrix, annot=True, fmt=".2f", cmap="coolwarm", cbar_kws={'label': 'Correlation Coefficient'})
plt.title("Correlation Heatmap of Player Metrics")
plt.show()

# Distribution plot for Points Per Game (PTS)
plt.figure(figsize=(10, 6))
sns.histplot(nba_data['PTS'].dropna(), kde=True, bins=30, color='blue', alpha=0.7)
plt.title("Distribution of Points Per Game (PTS)")
plt.xlabel("Points Per Game (PTS)")
plt.ylabel("Frequency")
plt.show()
```
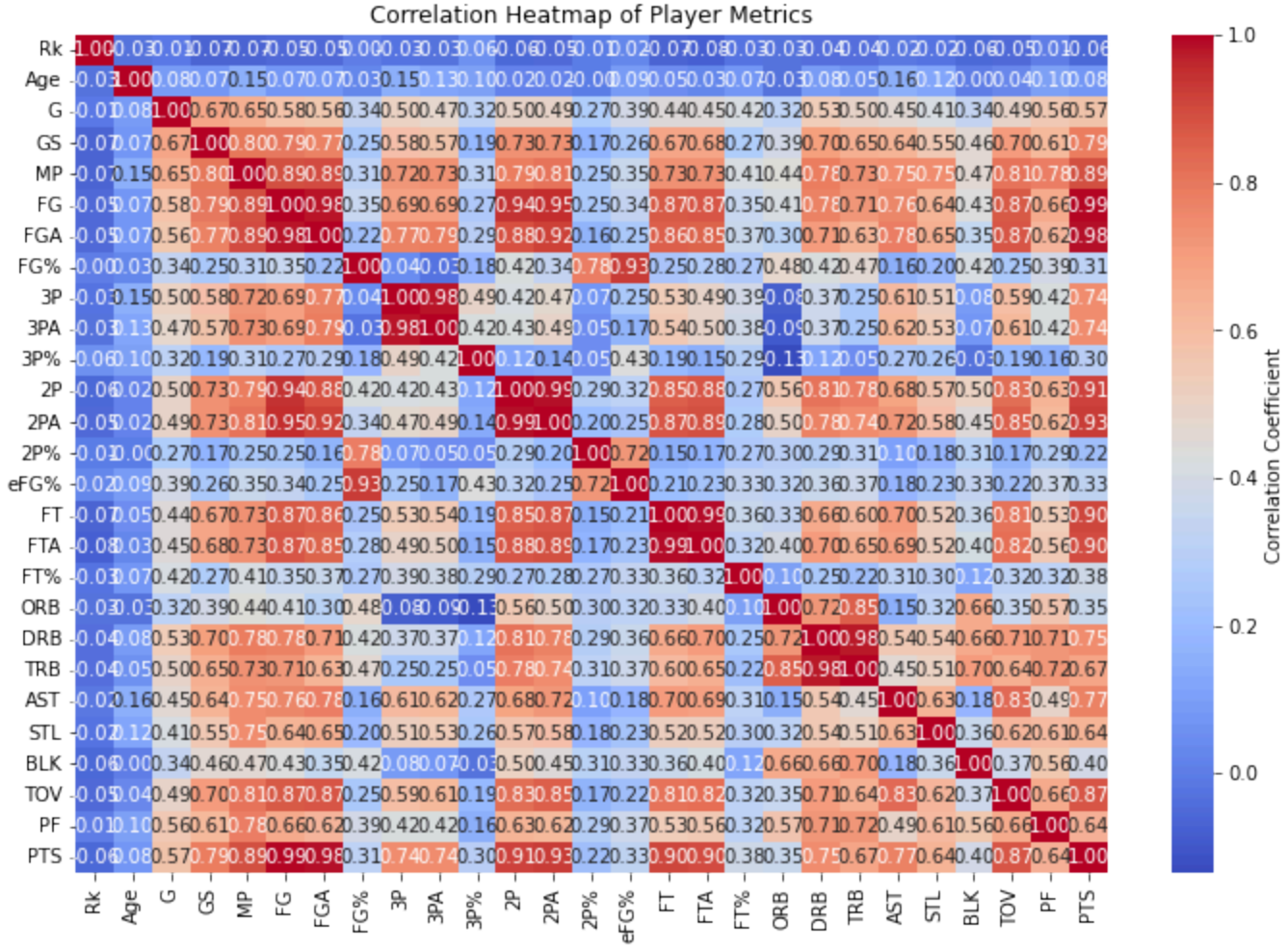
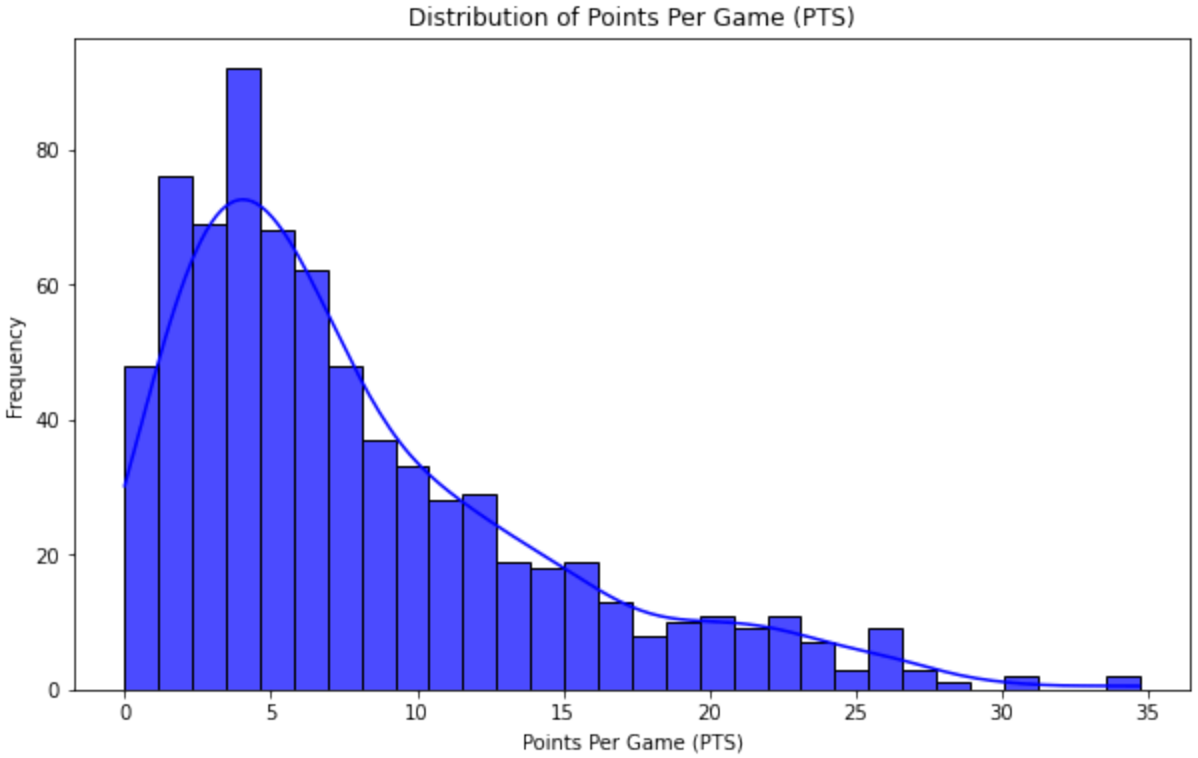



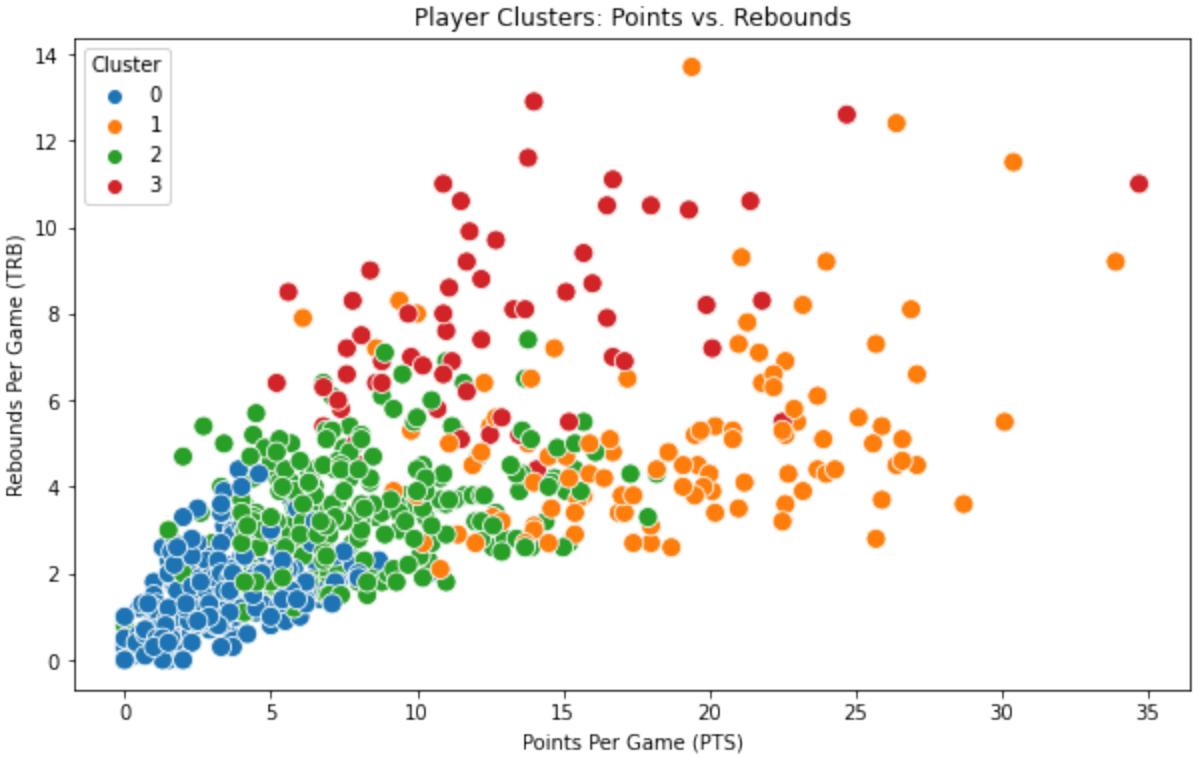


In [3]:

```python
# Prepare data for clustering
performance_metrics = nba_data[['PTS', 'TRB', 'AST', 'STL', 'BLK']].dropna()
scaler = StandardScaler()
scaled_metrics = scaler.fit_transform(performance_metrics)

# Apply K-Means clustering
kmeans = KMeans(n_clusters=4, random_state=42)
clusters = kmeans.fit_predict(scaled_metrics)
performance_metrics['Cluster'] = clusters

# Scatter plot for clustering
plt.figure(figsize=(10, 6))
sns.scatterplot(data=performance_metrics, x='PTS', y='TRB', hue='Cluster', palette='tab10', s=100)
plt.title("Player Clusters: Points vs. Rebounds")
plt.xlabel("Points Per Game (PTS)")
plt.ylabel("Rebounds Per Game (TRB)")
plt.legend(title="Cluster")
plt.show()
```



In [4]:

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# Prepare data for predictive modeling
features = nba_data[['PTS', 'TRB', 'AST', 'STL', 'BLK']].dropna()
target = nba_data['PTS'].dropna()

# Train-test split
X_train, X_test, y_train, y_test = train_test_split(features, target, test_size=0.2, random_state=42)

# Linear regression
model = LinearRegression()
model.fit(X_train, y_train)

# Predictions
y_pred = model.predict(X_test)

# Evaluate model
print("Mean Squared Error:", mean_squared_error(y_test, y_pred))
print("R^2 Score:", r2_score(y_test, y_pred))

# Visualization: Predicted vs Actual Points
plt.figure(figsize=(10, 6))
```

```
plt.scatter(y_test, y_pred, alpha=0.7, edgecolors='w')
plt.plot([y_test.min(), y_test.max()], [y_test.min(), y_test.max()], 'r--', lw=2)
plt.title("Model Evaluation: Predicted vs Actual Points")
plt.xlabel("Actual Points")
plt.ylabel("Predicted Points")
plt.show()
```

```
Mean Squared Error: 9.730379680095738e-30
R^2 Score: 1.0
```