Global Patterns of Smartphone Addiction: Insights from 10 Countries Dataset (2024)

July 22, 2025

[80]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

[81]:
```
df = pd.read_csv('../data/mobile_addiction_dataset.csv')
print(df.head())
print(df.info())
```

```
   User_ID  Country  Age  Gender   Occupation Education_Level  Income_USD  \
0        1    India   32    Male  Salesperson     High School    43865.49
1        2       UK   26    Male       Artist        Master's    41868.19
2        3  Germany   70   Other       Doctor     High School    59636.51
3        4       UK   44  Female     Engineer             NaN    39022.07
4        5   Brazil   46   Other      Student             NaN     -783.98

   Daily_Screen_Time_Hours  Phone_Unlocks_Per_Day  Social_Media_Usage_Hours  \
0                     5.81                     75                      0.84
1                     9.05                     61                      3.13
2                     5.76                     58                      2.12
3                     6.71                     80                      1.60
4                     6.31                    136                      1.51

   ...  Online_Shopping_Hours  Internet_Connection_Type  Primary_Device_Brand  \
0  ...                   1.85                       5G                 Other
1  ...                   0.66                       4G               Samsung
2  ...                  -0.14                     WiFi               Samsung
3  ...                   0.17                       3G                 Apple
4  ...                   0.58                       3G                Xiaomi

   Has_Screen_Time_Management_App  Self_Reported_Addiction_Level  \
0                              No                            Low
1                             Yes                         Severe
2                             Yes                         Severe
3                             Yes                       Moderate
4                              No                           High
```

```
   Monthly_Data_Usage_GB  Has_Night_Mode_On  Age_First_Phone  \
0                  16.43                Yes               16
1                  32.87                 No               12
2                  27.45                 No               18
3                  30.85                 No               17
4                  10.38                Yes               18

   Push_Notifications_Per_Day  Tech_Savviness_Score
0                         106                 39.36
1                         111                  9.45
2                          90                 50.27
3                          60                 30.82
4                         127                 21.70

[5 rows x 34 columns]
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3000 entries, 0 to 2999
Data columns (total 34 columns):
 #   Column                          Non-Null Count  Dtype
---  ------                          --------------  -----
 0   User_ID                         3000 non-null   int64
 1   Country                         3000 non-null   object
 2   Age                             3000 non-null   int64
 3   Gender                          3000 non-null   object
 4   Occupation                      3000 non-null   object
 5   Education_Level                 2388 non-null   object
 6   Income_USD                      3000 non-null   float64
 7   Daily_Screen_Time_Hours         3000 non-null   float64
 8   Phone_Unlocks_Per_Day           3000 non-null   int64
 9   Social_Media_Usage_Hours        3000 non-null   float64
 10  Gaming_Usage_Hours              3000 non-null   float64
 11  Streaming_Usage_Hours           3000 non-null   float64
 12  Messaging_Usage_Hours           3000 non-null   float64
 13  Work_Related_Usage_Hours        3000 non-null   float64
 14  Sleep_Hours                     3000 non-null   float64
 15  Physical_Activity_Hours         3000 non-null   float64
 16  Mental_Health_Score             3000 non-null   float64
 17  Depression_Score                3000 non-null   float64
 18  Anxiety_Score                   3000 non-null   float64
 19  Stress_Level                    3000 non-null   float64
 20  Relationship_Status             3000 non-null   object
 21  Has_Children                    3000 non-null   object
 22  Urban_or_Rural                  3000 non-null   object
 23  Time_Spent_With_Family_Hours    3000 non-null   float64
 24  Online_Shopping_Hours           3000 non-null   float64
 25  Internet_Connection_Type        3000 non-null   object
 26  Primary_Device_Brand            3000 non-null   object
 27  Has_Screen_Time_Management_App  3000 non-null   object
```

```
 28  Self_Reported_Addiction_Level   3000 non-null   object
 29  Monthly_Data_Usage_GB           3000 non-null   float64
 30  Has_Night_Mode_On               3000 non-null   object
 31  Age_First_Phone                 3000 non-null   int64
 32  Push_Notifications_Per_Day      3000 non-null   int64
 33  Tech_Savviness_Score            3000 non-null   float64
dtypes: float64(17), int64(5), object(12)
memory usage: 797.0+ KB
None
```

[82]:
```
df["Education_Level"] = df["Education_Level"].fillna("Unknown")
```

[83]:
```
# Missing values are checked for each column
print("Missing values:\n", df.isna().sum())
```

```
Missing values:
 User_ID                          0
Country                           0
Age                               0
Gender                            0
Occupation                        0
Education_Level                   0
Income_USD                        0
Daily_Screen_Time_Hours           0
Phone_Unlocks_Per_Day             0
Social_Media_Usage_Hours          0
Gaming_Usage_Hours                0
Streaming_Usage_Hours             0
Messaging_Usage_Hours             0
Work_Related_Usage_Hours          0
Sleep_Hours                       0
Physical_Activity_Hours           0
Mental_Health_Score               0
Depression_Score                  0
Anxiety_Score                     0
Stress_Level                      0
Relationship_Status               0
Has_Children                      0
Urban_or_Rural                    0
Time_Spent_With_Family_Hours      0
Online_Shopping_Hours             0
Internet_Connection_Type          0
Primary_Device_Brand              0
Has_Screen_Time_Management_App    0
Self_Reported_Addiction_Level     0
Monthly_Data_Usage_GB             0
Has_Night_Mode_On                 0
Age_First_Phone                   0
```

```
Push_Notifications_Per_Day        0
Tech_Savviness_Score              0
dtype: int64
```

[84]:
```
#the average daily screen time per country
avg_screen_time_by_country = df.groupby("Country")["Daily_Screen_Time_Hours"].
 ↪mean()
print(avg_screen_time_by_country)
```

```
Country
Brazil     5.889658
China      5.913686
Germany    5.904099
India      6.135248
Japan      5.885868
Mexico     6.125647
Nigeria    5.856580
Russia     6.087319
UK         5.992247
USA        6.058139
Name: Daily_Screen_Time_Hours, dtype: float64
```

[85]:
```
#how frequently each self-reported addiction level appears in the data
addiction_dist = df["Self_Reported_Addiction_Level"].value_counts()
print(addiction_dist)
```

```
Self_Reported_Addiction_Level
High        764
Low         756
Severe      750
Moderate    730
Name: count, dtype: int64
```

[86]:
```
#the average income based on education level
avg_income_by_edu = df.groupby("Education_Level")["Income_USD"].mean()
print(avg_income_by_edu)
```

```
Education_Level
Bachelor's      29160.826911
High School     30106.320596
Master's        29869.283750
PhD             29577.158443
Unknown         30127.905000
Name: Income_USD, dtype: float64
```

[87]:
```
#total number of phone unlocks per day grouped by gender
unlocks_by_gender = df.groupby("Gender")["Phone_Unlocks_Per_Day"].sum()
print(unlocks_by_gender)
```

```
Gender
Female    76418
Male      83580
Other     79101
Name: Phone_Unlocks_Per_Day, dtype: int64
```

[88]:
```
#the top 5 countries with the highest average social media usage time
top_social_media = df.groupby("Country")["Social_Media_Usage_Hours"].mean().
 ↪nlargest(5)
print(top_social_media)
```

```
Country
Japan      2.105331
Germany    2.052544
UK         2.019114
USA        1.993470
Brazil     1.993322
Name: Social_Media_Usage_Hours, dtype: float64
```

[89]:
```
#how addiction levels vary with different amounts of screen time
screen_vs_addiction = df.
 ↪groupby("Daily_Screen_Time_Hours")["Self_Reported_Addiction_Level"].
 ↪value_counts()
print(screen_vs_addiction.head())
```

```
Daily_Screen_Time_Hours  Self_Reported_Addiction_Level
-0.50                    Severe                          1
-0.47                    High                            1
-0.44                    Moderate                        1
-0.27                    Severe                          1
-0.19                    Severe                          1
Name: count, dtype: int64
```

[90]:
```
#how many users have a screen time management app installed
screen_time_app_count = len(df[df["Has_Screen_Time_Management_App"] == "Yes"])
print(f"Users with Screen Time App: {screen_time_app_count}")
```

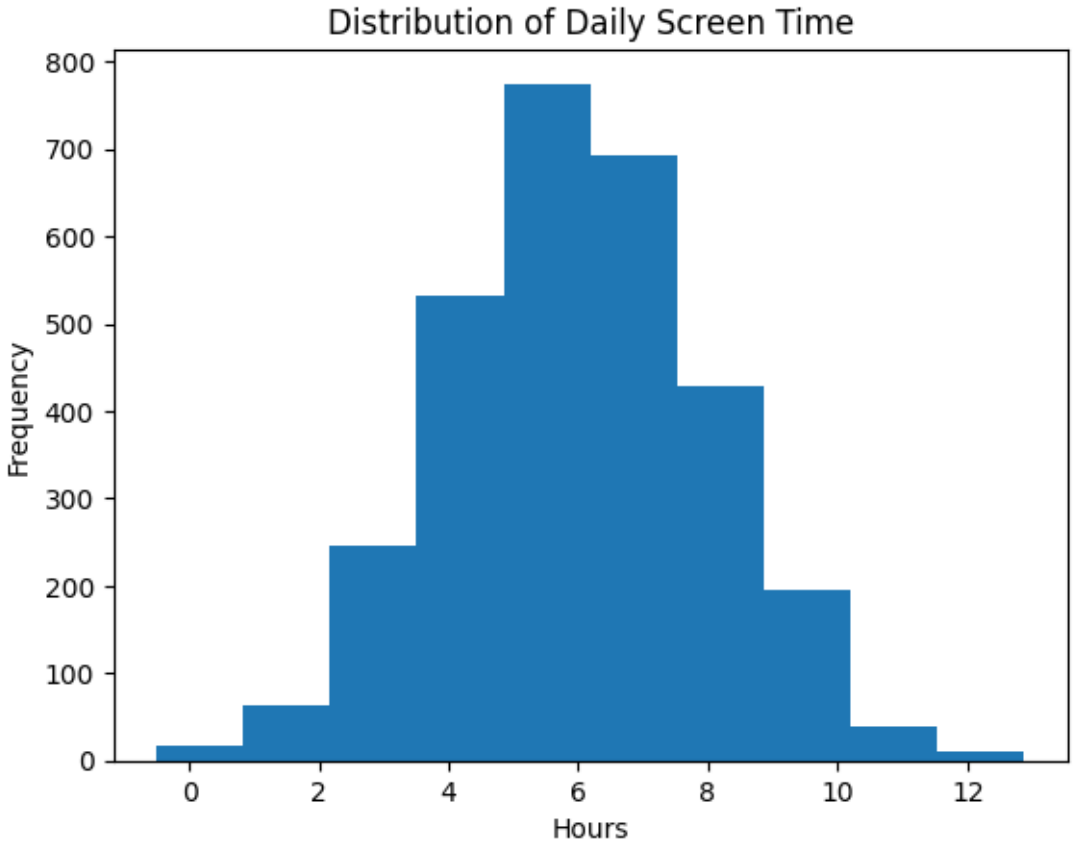
```
Users with Screen Time App: 1462
```

[91]:
```
#the average mental health score for each country
mental_health_by_country = df.groupby("Country")["Mental_Health_Score"].mean()
print(mental_health_by_country)
```

```
Country
Brazil     49.327945
China      52.073584
```

```
Germany     47.113710
India       52.938865
Japan       48.431136
Mexico      50.409653
Nigeria     49.529414
Russia      47.547319
UK          51.639494
USA         51.207256
Name: Mental_Health_Score, dtype: float64
```

[92]:
```
df["Daily_Screen_Time_Hours"].plot(kind="hist")
plt.title("Distribution of Daily Screen Time")
plt.xlabel("Hours")
plt.show()
```



[93]:
```
#the top 5 occupations with the highest average daily screen time
top_jobs_by_screen = df.groupby("Occupation")["Daily_Screen_Time_Hours"].mean().
 ↪nlargest(5)
print(top_jobs_by_screen)
```

```
Occupation
Teacher       6.077572
Manager       6.052771
Artist        6.002591
Unemployed    5.991811
Engineer      5.964560
Name: Daily_Screen_Time_Hours, dtype: float64
```

[94]:
```
#what percentage of males use night mode on their devices
night_mode_by_gender = len(df[(df["Has_Night_Mode_On"] == "Yes") & (df["Gender"]␣
 ↪== "Male")]) / len(df[df["Gender"] == "Male"]) * 100
print(f"Percentage of Male with Night Mode: {night_mode_by_gender:.2f}%")
```

```
Percentage of Male with Night Mode: 50.33%
```

[95]:
```
#how addiction levels vary based on hours of physical activity
activity_vs_addiction = df.
 ↪groupby("Physical_Activity_Hours")["Self_Reported_Addiction_Level"].
 ↪value_counts()
print(activity_vs_addiction.head())
```

```
Physical_Activity_Hours  Self_Reported_Addiction_Level
-0.84                    Severe                          1
-0.75                    Low                             1
-0.71                    Severe                          1
-0.70                    High                            1
-0.68                    High                            1
Name: count, dtype: int64
```

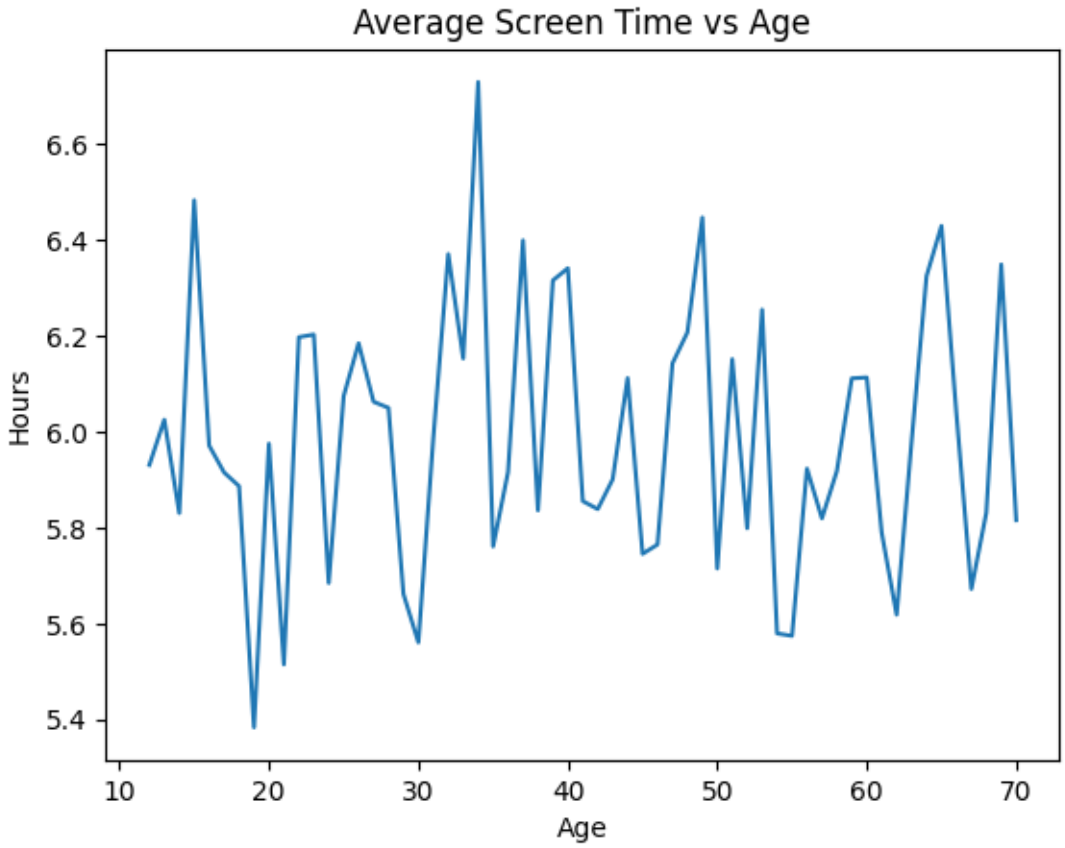
[96]:
```
#Groups people by age ranges and calculates their average income
age_bins = pd.cut(df["Age"], bins=[18, 30, 40, 50, 60, 70])
income_by_age = df.groupby(age_bins, observed=True)["Income_USD"].mean()
print(income_by_age)
```

```
Age
(18, 30]    30250.387681
(30, 40]    28910.335403
(40, 50]    29907.119830
(50, 60]    29919.571245
(60, 70]    30498.508987
Name: Income_USD, dtype: float64
```

[97]:
```
#how many users received their first phone before the age of 15
early_phone_count = len(df[df["Age_First_Phone"] < 15])
print(f"Users with Phone Before 15: {early_phone_count}")
```

```
Users with Phone Before 15: 1623
```

[98]:
```
df.groupby("Age")["Daily_Screen_Time_Hours"].mean().plot(kind="line")
plt.title("Average Screen Time vs Age")
plt.ylabel("Hours")
plt.show()
```



[99]:
```
#For India only: shows how push notifications per day relate to reported␣
 ↪addiction levels
india_notif_vs_addiction = df[df["Country"] == "India"].
 ↪groupby("Push_Notifications_Per_Day")["Self_Reported_Addiction_Level"].
 ↪value_counts()
print(india_notif_vs_addiction.head())
```

```
Push_Notifications_Per_Day  Self_Reported_Addiction_Level
21                          Moderate                        1
24                          High                            1
```

```
26                          High                        1
28                          Severe                      1
37                          High                        1
Name: count, dtype: int64
```

[100]:
```
#monthly data usage (GB) for each country
total_data_by_country = df.groupby("Country")["Monthly_Data_Usage_GB"].sum()
print(total_data_by_country)
```

```
Country
Brazil     7113.24
China      7267.51
Germany    7063.40
India      6979.09
Japan      8020.34
Mexico     7884.76
Nigeria    7823.32
Russia     6874.00
UK         7738.58
USA        7851.29
Name: Monthly_Data_Usage_GB, dtype: float64
```

[101]:
```
#the top 5 users with the most streaming hours
top_streaming_users = df.nlargest(5, "Streaming_Usage_Hours")[["User_ID",␣
↪"Streaming_Usage_Hours"]]
print(top_streaming_users)
```

```
      User_ID  Streaming_Usage_Hours
1781     1782                   5.18
436       437                   5.12
2913     2914                   5.00
2446     2447                   4.96
644       645                   4.95
```

[102]:
```
#distribution of online shopping time for each education level
shopping_by_edu = df.groupby("Education_Level")["Online_Shopping_Hours"].
↪value_counts()
print(shopping_by_edu.head())
```

```
Education_Level  Online_Shopping_Hours
Bachelor's       0.70                    11
                 1.05                    11
                 0.86                    10
                 1.14                     8
                 0.63                     7
Name: count, dtype: int64
```

[103]:
```
#the average sleep duration for each level of self-reported addiction
sleep_by_addiction = df.groupby("Self_Reported_Addiction_Level")["Sleep_Hours"].
 ↪mean()
print(sleep_by_addiction)
```

```
Self_Reported_Addiction_Level
High        6.466021
Low         6.491892
Moderate    6.494178
Severe      6.519307
Name: Sleep_Hours, dtype: float64
```

[104]:
```
#the average social media usage between males and females
gender_vs_social = df.groupby("Gender")["Social_Media_Usage_Hours"].mean()
print(gender_vs_social)
```

```
Gender
Female    1.983853
Male      2.017545
Other     1.962263
Name: Social_Media_Usage_Hours, dtype: float64
```

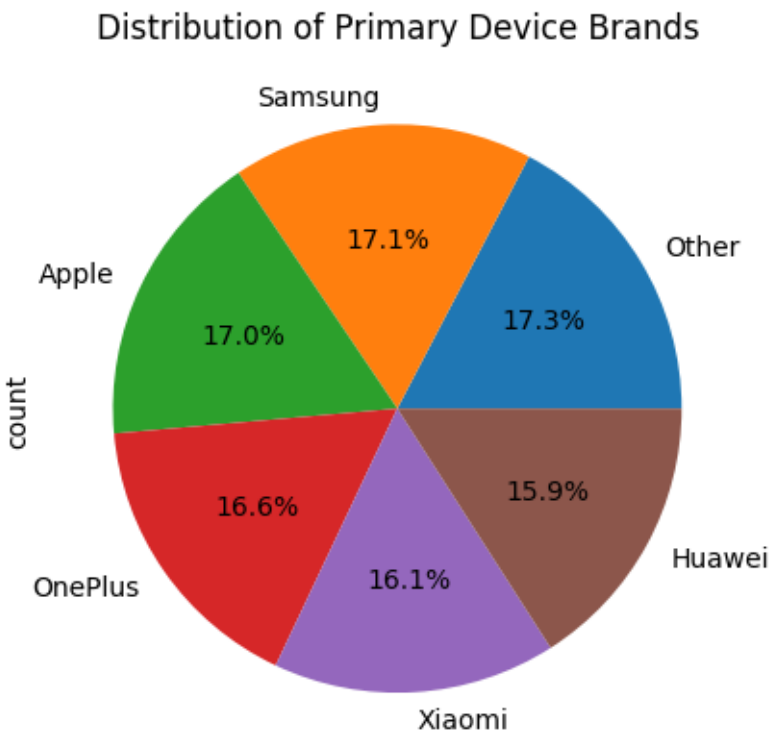
[105]:
```
#how many users are from urban vs rural areas
urban_rural_dist = df["Urban_or_Rural"].value_counts()
print(urban_rural_dist)
```

```
Urban_or_Rural
Urban    1505
Rural    1495
Name: count, dtype: int64
```

[106]:
```
#percentage of severe addiction cases in Brazil
severe_addiction_brazil = len(df[(df["Country"] == "Brazil") &␣
 ↪(df["Self_Reported_Addiction_Level"] == "Severe")]) / len(df[df["Country"] ==␣
 ↪"Brazil"]) * 100
print(f"Percentage of Severe Addiction in Brazil: {severe_addiction_brazil:.
 ↪2f}%")
```

```
Percentage of Severe Addiction in Brazil: 26.03%
```

[107]:
```
df["Primary_Device_Brand"].value_counts().plot(kind="pie", autopct='%1.1f%%')
plt.title("Distribution of Primary Device Brands")
plt.show()
```



[108]:
```
#the average technology savviness scores per country
tech_score_by_country = df.groupby("Country")["Tech_Savviness_Score"].mean()
print(tech_score_by_country)
```

```
Country
Brazil     50.314521
China      48.102082
Germany    49.804558
India      49.013759
Japan      49.634448
Mexico     50.632334
Nigeria    48.990749
Russia     48.908442
UK         49.481297
USA        49.559653
Name: Tech_Savviness_Score, dtype: float64
```

[109]:
```
#the effect of internet connection type on data consumption
conn_vs_data = df.groupby("Internet_Connection_Type")["Monthly_Data_Usage_GB"].
 ↪mean()
print(conn_vs_data)
```

```
Internet_Connection_Type
3G      24.229650
4G      24.941846
5G      24.922282
WiFi    25.430055
Name: Monthly_Data_Usage_GB, dtype: float64
```

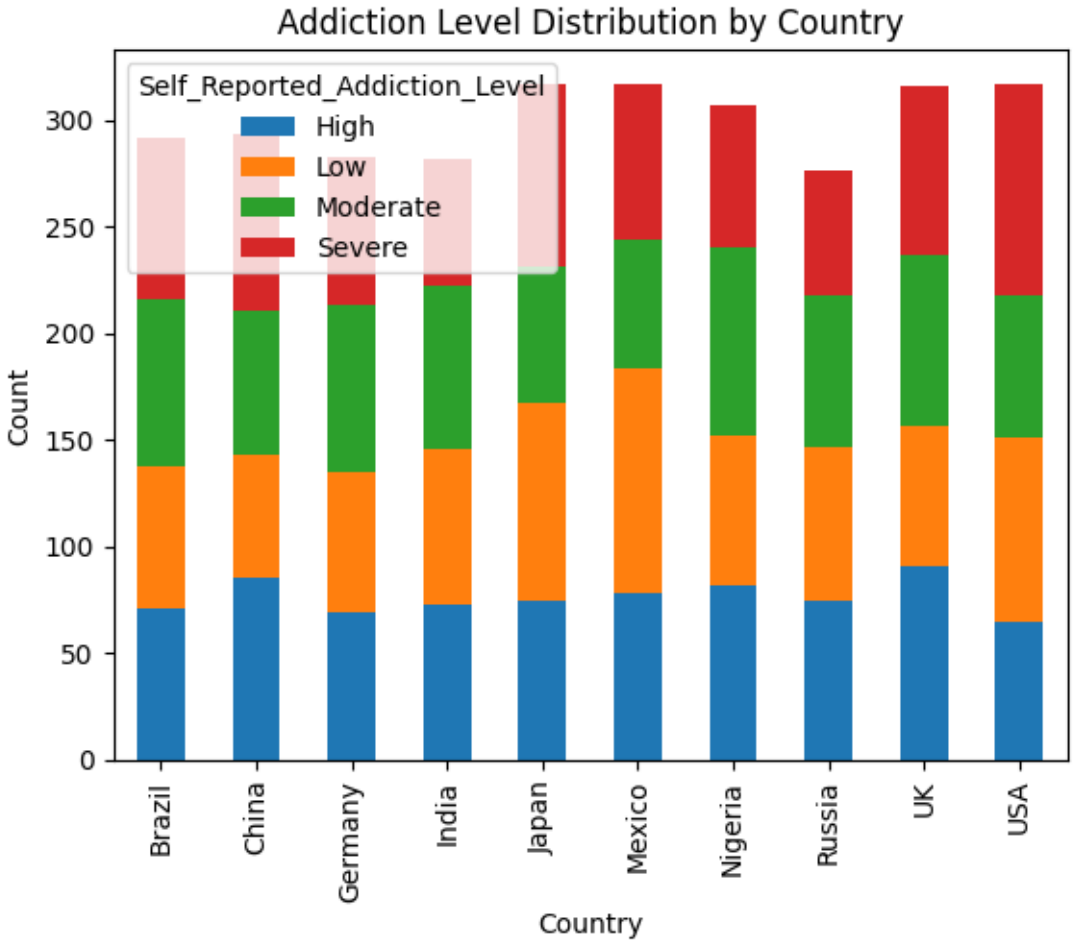
[110]:
```
#physical activity hours by age
total_activity_by_age = df.groupby("Age")["Physical_Activity_Hours"].sum()
print(total_activity_by_age.head())
```

```
Age
12    41.53
13    56.21
14    50.95
15    39.12
16    55.11
Name: Physical_Activity_Hours, dtype: float64
```

[111]:
```
#the top 5 countries with the highest average number of daily push notifications
top_notif_countries = df.groupby("Country")["Push_Notifications_Per_Day"].mean().
 ↪nlargest(5)
print(top_notif_countries)
```

```
Country
Nigeria    102.736156
Mexico     101.949527
UK         101.579114
Brazil      99.715753
USA         99.375394
Name: Push_Notifications_Per_Day, dtype: float64
```

[112]:
```
df.groupby(["Country", "Self_Reported_Addiction_Level"]).size().unstack().
 ↪plot(kind="bar", stacked=True)
plt.title("Addiction Level Distribution by Country")
plt.ylabel("Count")
plt.show()
```



[113]:
```
pivot = df.pivot_table(values="Daily_Screen_Time_Hours",␣
↪index="Push_Notifications_Per_Day", aggfunc="mean")
sns.heatmap(pivot)
plt.title("Screen Time vs Push Notifications")
plt.show()
```