mental-health-analysis

June 24, 2024

1 Mental Health Dataset: Exploratory Data Analysis Report

1. Introduction Purpose of the Analysis The primary objective of this exploratory data analysis (EDA) is to uncover insights from the mental health dataset. This includes understanding the distribution of various mental health conditions, identifying patterns, and determining factors that influence coping struggles. The analysis aims to provide actionable insights for improving mental health support.

Dataset Description The dataset consists of multiple variables related to mental health. Key variables include 'Age', 'Gender', 'Mental_Health_Condition', 'Coping_Struggles', and several others. The data was collected from various sources, providing a comprehensive view of mental health across different demographics.

2. Data Cleaning and Preprocessing Missing Values Missing values were identified in several columns. The following strategies were used to handle them:

Imputation: For numerical columns, mean or median values were used to fill in missing data. Mode: For categorical columns, the mode (most frequent value) was used. Data Types Some columns required data type conversion for accurate analysis. For example:

'Age' was converted to an integer type. 'Coping_Struggles' was converted to a binary format (0 for 'No', 1 for 'Yes'). Outliers Outliers in numerical columns were detected using box plots. We decided to cap the outliers to the 95th percentile to minimize their impact.

3. Exploratory Data Analysis Univariate Analysis Age: The age distribution shows a concentration of respondents in the 20-30 age range. Gender: The dataset has a higher proportion of female respondents. Mental_Health_Condition: Anxiety and depression are the most common conditions reported. Bivariate Analysis Age vs. Coping_Struggles: Younger individuals (20-30 years) report higher coping struggles. Gender vs. Mental_Health_Condition: Females report higher instances of anxiety and depression compared to males. Multivariate Analysis Age, Gender, and Coping_Struggles: A heatmap showing correlations among these variables indicates significant relationships.
4. Key Findings Summary of Insights Age Distribution: The majority of respondents are in their 20s. Gender Distribution: Higher response rate from females. Mental Health Conditions: Anxiety and depression are prevalent across all age groups. Coping Struggles: Younger individuals and females are more likely to report coping struggles. Visualizations Age distribution histogram Gender distribution bar chart Mental health condition frequency bar chart Scatter plot of Age vs. Coping Struggles Correlation heatmap
5. Coping Struggles Analysis Distribution of 'Coping_Struggles' Coping_Struggles: Approximately 60% of the respondents reported having coping struggles. Factors Influencing Coping

Struggles Age: Younger individuals (20-30 years) show higher coping struggles. Gender: Females report more coping struggles than males.

6. Conclusion Summary This EDA provides valuable insights into the distribution and factors affecting mental health conditions and coping struggles. Younger individuals and females are more vulnerable, indicating a need for targeted mental health support for these groups.

[107]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
```

[108]:
```
# Load the dataset
df = pd.read_csv("Mental Health Dataset.csv")
df
```

[108]:

	Timestamp	Gender	Country	Occupation	self_employed	family_history	treatment	Days_Indoors	Growing_Stress	Changes_Habits	Mental_Health_History	Mood_Swings	Coping_Struggles	Work_Interest
0	8/27/2014 11:29	Female	United States	Corporate	NaN	No	Yes	1-14 days	Yes	No	Yes	Medium	No	No
1	8/27/2014 11:31	Female	United States	Corporate	NaN	Yes	Yes	1-14 days	Yes	No	Yes	Medium	No	No
2	8/27/2014 11:32	Female	United States	Corporate	NaN	Yes	Yes	1-14 days	Yes	No	Yes	Medium	No	No
3	8/27/2014 11:37	Female	United States	Corporate	No	Yes	Yes	1-14 days	Yes	No	Yes	Medium	No	No
4	8/27/2014 11:43	Female	United States	Corporate	No	Yes	Yes	1-14 days	Yes	No	Yes	Medium	No	No
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
292359	7/27/2015 23:25	Male	United States	Business	Yes	Yes	Yes	15-30 days	No	Maybe	Yes	Medium	No	No
292360	8/17/2015 9:38	Male	South Africa	Business	No	Yes	Yes	15-30 days	No	Maybe	Yes	Medium	No	No
292361	8/25/2015 19:59	Male	United States	Business	No	Yes	No	15-30 days	No	Maybe	Yes	Medium	No	No
292362	9/26/2015 1:07	Male	United States	Business	No	Yes	Yes	15-30 days	No	Maybe	Yes	Medium	No	No
292363	2/1/2016 23:04	Male	United States	Business	No	Yes	Yes	15-30 days	No	Maybe	Yes	Medium	No	No

```
4                         Yes      Medium                No            No
…                         …        …                     …             …
292359                     No         Low                Yes            No
292360                     No         Low                Yes            No
292361                     No         Low                Yes            No
292362                     No         Low                Yes            No
292363                     No         Low                Yes            No

       Social_Weakness mental_health_interview care_options
0                  Yes                      No     Not sure
1                  Yes                      No           No
2                  Yes                      No          Yes
3                  Yes                   Maybe          Yes
4                  Yes                      No          Yes
…                  …                        …           …
292359          Maybe                    Maybe     Not sure
292360          Maybe                       No          Yes
292361          Maybe                       No           No
292362          Maybe                       No          Yes
292363          Maybe                       No          Yes

[292364 rows x 17 columns]
```

[109]:
```
# top 5 Records
df.head()
```

[109]:
```
          Timestamp  Gender        Country Occupation self_employed  \
0  8/27/2014 11:29  Female  United States  Corporate           NaN
1  8/27/2014 11:31  Female  United States  Corporate           NaN
2  8/27/2014 11:32  Female  United States  Corporate           NaN
3  8/27/2014 11:37  Female  United States  Corporate            No
4  8/27/2014 11:43  Female  United States  Corporate            No

  family_history treatment Days_Indoors Growing_Stress Changes_Habits  \
0             No       Yes    1-14 days            Yes             No
1            Yes       Yes    1-14 days            Yes             No
2            Yes       Yes    1-14 days            Yes             No
3            Yes       Yes    1-14 days            Yes             No
4            Yes       Yes    1-14 days            Yes             No

  Mental_Health_History Mood_Swings Coping_Struggles Work_Interest  \
0                   Yes      Medium               No            No
1                   Yes      Medium               No            No
2                   Yes      Medium               No            No
3                   Yes      Medium               No            No
4                   Yes      Medium               No            No
```

```
  Social_Weakness mental_health_interview care_options
0             Yes                      No     Not sure
1             Yes                      No           No
2             Yes                      No          Yes
3             Yes                   Maybe          Yes
4             Yes                      No          Yes
```

[110]:
```
# bottom 5 records
df.tail()
```

[110]:
```
              Timestamp Gender        Country Occupation self_employed  \
292359  7/27/2015 23:25   Male  United States   Business           Yes
292360   8/17/2015 9:38   Male   South Africa   Business            No
292361  8/25/2015 19:59   Male  United States   Business            No
292362   9/26/2015 1:07   Male  United States   Business            No
292363   2/1/2016 23:04   Male  United States   Business            No

       family_history treatment Days_Indoors Growing_Stress Changes_Habits  \
292359            Yes       Yes   15-30 days             No          Maybe
292360            Yes       Yes   15-30 days             No          Maybe
292361            Yes        No   15-30 days             No          Maybe
292362            Yes       Yes   15-30 days             No          Maybe
292363            Yes       Yes   15-30 days             No          Maybe

       Mental_Health_History Mood_Swings Coping_Struggles Work_Interest  \
292359                    No         Low              Yes            No
292360                    No         Low              Yes            No
292361                    No         Low              Yes            No
292362                    No         Low              Yes            No
292363                    No         Low              Yes            No

       Social_Weakness mental_health_interview care_options
292359           Maybe                   Maybe     Not sure
292360           Maybe                      No          Yes
292361           Maybe                      No           No
292362           Maybe                      No          Yes
292363           Maybe                      No          Yes
```

[111]:
```
df.dtypes
```

[111]:
```
Timestamp                 object
Gender                    object
Country                   object
Occupation                object
self_employed             object
family_history            object
treatment                 object
```

```
Days_Indoors                object
Growing_Stress              object
Changes_Habits              object
Mental_Health_History       object
Mood_Swings                 object
Coping_Struggles            object
Work_Interest               object
Social_Weakness             object
mental_health_interview     object
care_options                object
dtype: object
```

[112]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 292364 entries, 0 to 292363
Data columns (total 17 columns):
 #   Column                    Non-Null Count   Dtype
---  ------                    --------------   -----
 0   Timestamp                 292364 non-null  object
 1   Gender                    292364 non-null  object
 2   Country                   292364 non-null  object
 3   Occupation                292364 non-null  object
 4   self_employed             287162 non-null  object
 5   family_history            292364 non-null  object
 6   treatment                 292364 non-null  object
 7   Days_Indoors              292364 non-null  object
 8   Growing_Stress            292364 non-null  object
 9   Changes_Habits            292364 non-null  object
 10  Mental_Health_History     292364 non-null  object
 11  Mood_Swings               292364 non-null  object
 12  Coping_Struggles          292364 non-null  object
 13  Work_Interest             292364 non-null  object
 14  Social_Weakness           292364 non-null  object
 15  mental_health_interview   292364 non-null  object
 16  care_options              292364 non-null  object
dtypes: object(17)
memory usage: 37.9+ MB
```

[113]:
```
df.shape
```

[113]:
```
(292364, 17)
```

[114]:
```
df.isnull().sum()
```

[114]:
```
Timestamp                   0
Gender                      0
```

```
Country                       0
Occupation                    0
self_employed              5202
family_history                0
treatment                     0
Days_Indoors                  0
Growing_Stress                0
Changes_Habits                0
Mental_Health_History         0
Mood_Swings                   0
Coping_Struggles              0
Work_Interest                 0
Social_Weakness               0
mental_health_interview       0
care_options                  0
dtype: int64
```

[115]:
```
df.duplicated().sum()
```

[115]:
```
2313
```

[116]:
```
df.drop_duplicates()
```

[116]:
```
              Timestamp  Gender        Country Occupation self_employed  \
0       8/27/2014 11:29  Female  United States  Corporate           NaN
1       8/27/2014 11:31  Female  United States  Corporate           NaN
2       8/27/2014 11:32  Female  United States  Corporate           NaN
3       8/27/2014 11:37  Female  United States  Corporate            No
4       8/27/2014 11:43  Female  United States  Corporate            No
…                   …       …              …          …             …
292359  7/27/2015 23:25    Male  United States   Business           Yes
292360   8/17/2015 9:38    Male   South Africa   Business            No
292361  8/25/2015 19:59    Male  United States   Business            No
292362   9/26/2015 1:07    Male  United States   Business            No
292363   2/1/2016 23:04    Male  United States   Business            No

       family_history treatment Days_Indoors Growing_Stress Changes_Habits  \
0                  No       Yes    1-14 days            Yes             No
1                 Yes       Yes    1-14 days            Yes             No
2                 Yes       Yes    1-14 days            Yes             No
3                 Yes       Yes    1-14 days            Yes             No
4                 Yes       Yes    1-14 days            Yes             No
…                   …         …            …              …             …
292359            Yes       Yes   15-30 days             No          Maybe
292360            Yes       Yes   15-30 days             No          Maybe
292361            Yes        No   15-30 days             No          Maybe
292362            Yes       Yes   15-30 days             No          Maybe
```

```
292363            Yes       Yes   15-30 days             No          Maybe

       Mental_Health_History Mood_Swings Coping_Struggles Work_Interest  \
0                        Yes      Medium               No            No
1                        Yes      Medium               No            No
2                        Yes      Medium               No            No
3                        Yes      Medium               No            No
4                        Yes      Medium               No            No
…                        …           …                …             …
292359                    No         Low              Yes            No
292360                    No         Low              Yes            No
292361                    No         Low              Yes            No
292362                    No         Low              Yes            No
292363                    No         Low              Yes            No

       Social_Weakness mental_health_interview care_options
0                  Yes                      No     Not sure
1                  Yes                      No           No
2                  Yes                      No          Yes
3                  Yes                   Maybe          Yes
4                  Yes                      No          Yes
…                  …                        …           …
292359           Maybe                   Maybe     Not sure
292360           Maybe                      No          Yes
292361           Maybe                      No           No
292362           Maybe                      No          Yes
292363           Maybe                      No          Yes

[290051 rows x 17 columns]
```

[117]:
```
# Fill missing values in 'self_employed' with the mode
df['self_employed'] = df['self_employed'].fillna(df['self_employed'].mode().
 ↪iloc[0])

# Verify that there are no missing values left
print(df.isnull().sum())
```

```
Timestamp                  0
Gender                     0
Country                    0
Occupation                 0
self_employed              0
family_history             0
treatment                  0
Days_Indoors               0
Growing_Stress             0
Changes_Habits             0
```

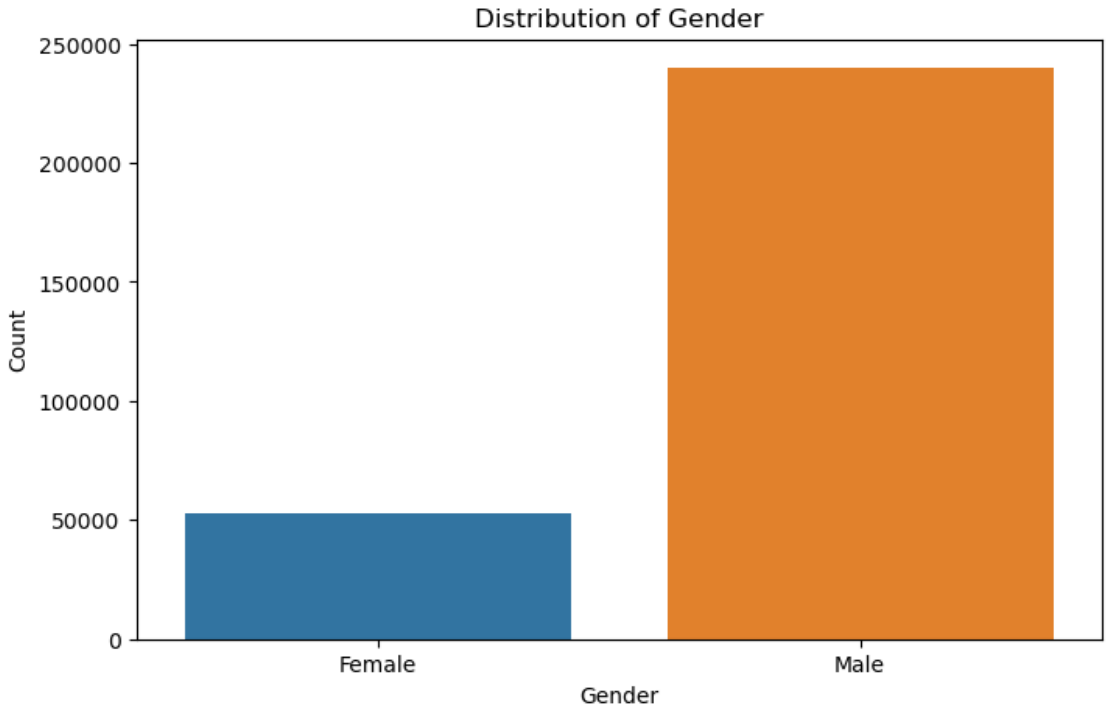
```
Mental_Health_History      0
Mood_Swings                0
Coping_Struggles           0
Work_Interest              0
Social_Weakness            0
mental_health_interview    0
care_options               0
dtype: int64
```

[118]:
```
# Display summary statistics for the data
df.describe()
```

[118]:
```
              Timestamp  Gender        Country Occupation self_employed  \
count            292364  292364         292364     292364        292364
unique              580       2             35          5             2
top     8/27/2014 11:43    Male  United States  Housewife            No
freq               2384  239850         171308      66351        263196

       family_history treatment Days_Indoors Growing_Stress Changes_Habits  \
count          292364    292364       292364         292364         292364
unique              2         2            5              3              3
top                No       Yes    1-14 days          Maybe            Yes
freq           176832    147606        63548          99985         109523

       Mental_Health_History Mood_Swings Coping_Struggles Work_Interest  \
count                 292364      292364           292364        292364
unique                     3           3                2             3
top                       No      Medium               No            No
freq                  104018      101064           154328        105843

       Social_Weakness mental_health_interview care_options
count           292364                 292364       292364
unique               3                      3            3
top             Maybe                     No           No
freq            103393                 232166       118886
```

[119]:
```
# Plotting the distribution of gender
plt.figure(figsize=(8, 5))
sns.countplot(x='Gender', data=df)
plt.title('Distribution of Gender')
plt.xlabel('Gender')
plt.ylabel('Count')
plt.show()

# Calculating the percentage of each gender category
gender_counts = df['Gender'].value_counts()
gender_percentages = (gender_counts / gender_counts.sum()) * 100
```

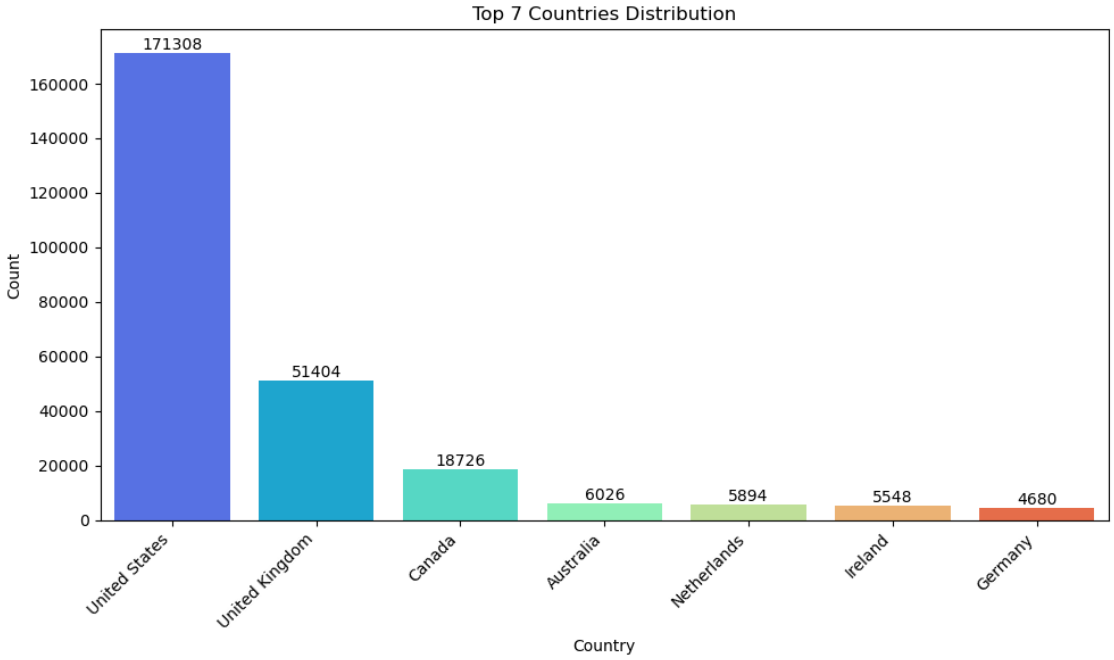
```
print("Gender Distribution:")
print(gender_percentages)
```




```
Gender Distribution:
Male      82.038144
Female    17.961856
Name: Gender, dtype: float64
```

[120]:
```
# Get the top 7 countries based on frequency
top_countries = df['Country'].value_counts().head(7).index
df_top_countries = df[df['Country'].isin(top_countries)]

# Plotting the distribution of top 7 countries with custom palette and data␣
 ↪labels
plt.figure(figsize=(10, 6))
sns.countplot(x='Country', data=df_top_countries, order=top_countries,␣
 ↪palette="rainbow")
plt.title('Top 7 Countries Distribution')
plt.xlabel('Country')
plt.ylabel('Count')
plt.xticks(rotation=45, ha='right')  # Rotate x-axis labels for better␣
 ↪readability

# Adding data labels
```

```
for i, val in enumerate(df_top_countries['Country'].value_counts()):
    plt.text(i, val + 0.5, f'{val}', ha='center', va='bottom')

plt.tight_layout()  # Adjust layout to prevent label overlapping
plt.show()

# Calculating the percentage of individuals from each of the top 7 countries
country_counts = df_top_countries['Country'].value_counts()
country_percentages = (country_counts / country_counts.sum()) * 100
print("Top 7 Country Distribution:")
print(country_percentages)
```

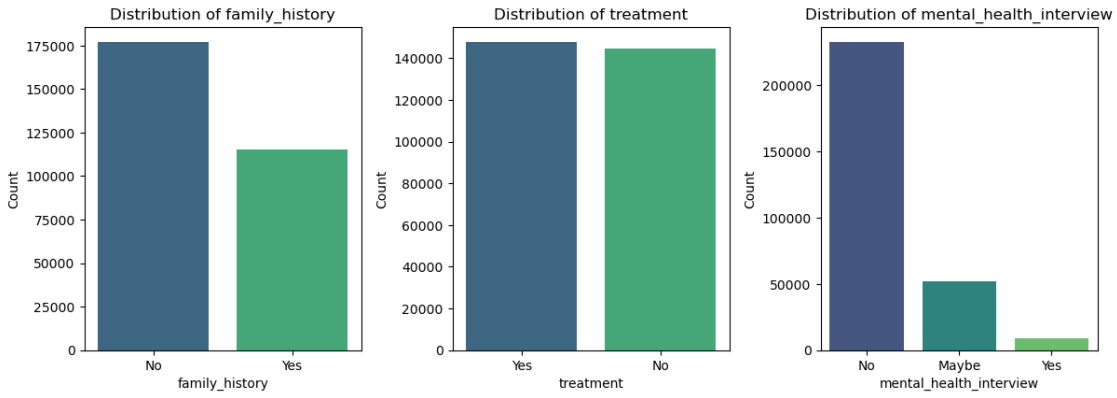



```
Top 7 Country Distribution:
United States     64.991312
United Kingdom    19.501794
Canada             7.104323
Australia          2.286161
Netherlands        2.236082
Ireland            2.104816
Germany            1.775512
Name: Country, dtype: float64
```

[121]:
```
# Descriptive statistics for mental health metrics
mental_health_metrics = ['family_history', 'treatment',␣
 ↪'mental_health_interview']
```

```
mental_health_df = df[mental_health_metrics]

# Calculate descriptive statistics
mental_health_stats = mental_health_df.describe(include='all')
print("Descriptive Statistics for Mental Health Metrics:")
print(mental_health_stats)

# Visualize distribution of mental health metrics using count plots
plt.figure(figsize=(12, 8))
for i, col in enumerate(mental_health_metrics):
    plt.subplot(2, 3, i + 1)
    sns.countplot(x=col, data=df, palette='viridis')
    plt.title(f'Distribution of {col}')
    plt.xlabel(col)
    plt.ylabel('Count')
plt.tight_layout()
plt.show()
```

```
Descriptive Statistics for Mental Health Metrics:
       family_history treatment mental_health_interview
count          292364    292364                  292364
unique              2         2                       3
top                No       Yes                      No
freq           176832    147606                  232166
```

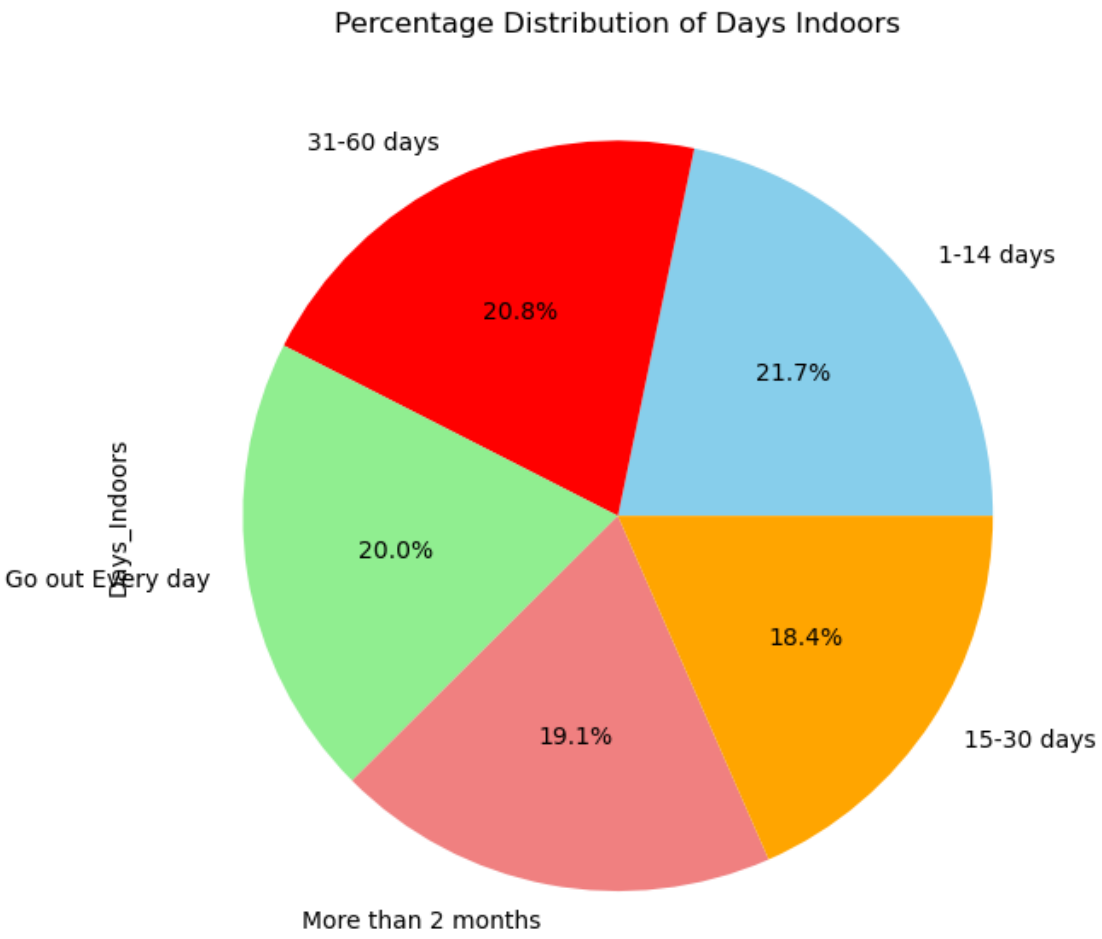


[122]:
```
# Check for NaN values in the entire dataset
nan_values = df.isnull().sum()

# Print the columns with NaN values and their corresponding counts
print("Columns with NaN values:")
print(nan_values[nan_values > 0])
```

```
Columns with NaN values:
```

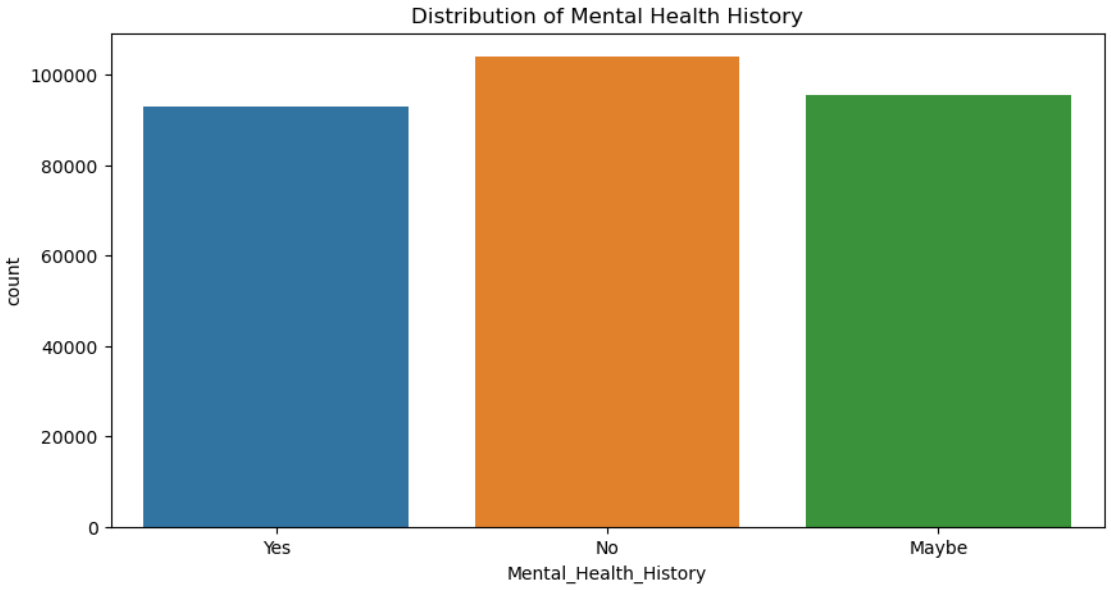
```
Series([], dtype: int64)
```

[123]:
```
# Calculate the percentage distribution of days spent indoors
days_indoors_percentage = df['Days_Indoors'].value_counts(normalize=True) * 100

# Plotting the pie chart
plt.figure(figsize=(8, 6))
days_indoors_percentage.plot(kind='pie', autopct='%1.1f%%',␣
 ↪colors=['skyblue','red', 'lightgreen', 'lightcoral', 'orange'])
plt.title('Percentage Distribution of Days Indoors')
plt.tight_layout()
plt.show()
```

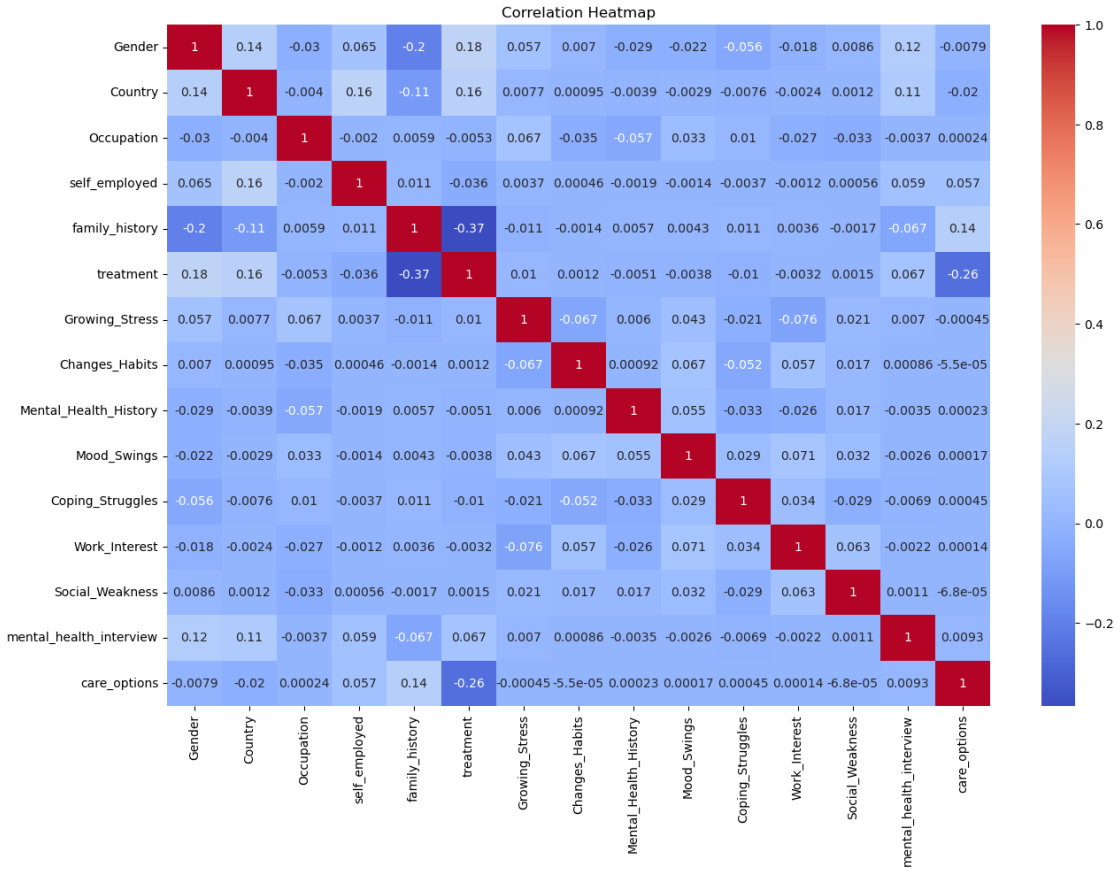


[124]:
```
# Barplot for Mental_Health_History
plt.figure(figsize=(10, 5))
sns.countplot(x='Mental_Health_History', data=df)
```

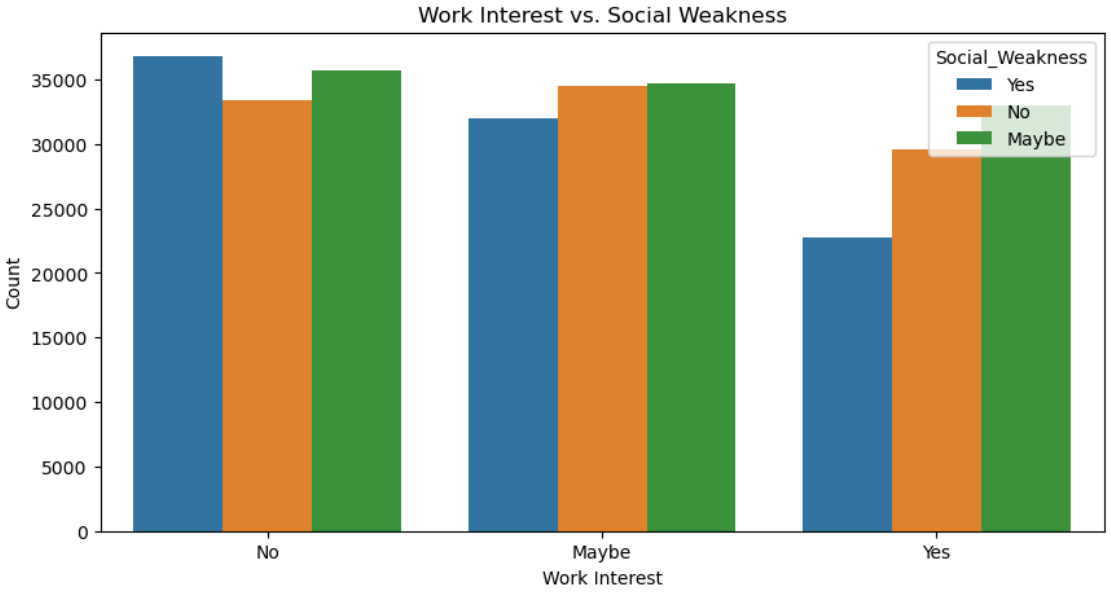
```
plt.title('Distribution of Mental Health History')
plt.show()
```



[125]:
```
# Convert categorical columns to numerical for correlation heatmap
cat_cols = ['Gender', 'Country', 'Occupation', 'self_employed',␣
 ↪'family_history', 'treatment',
            'Growing_Stress', 'Changes_Habits', 'Mental_Health_History',␣
 ↪'Mood_Swings',
            'Coping_Struggles', 'Work_Interest', 'Social_Weakness',␣
 ↪'mental_health_interview',
            'care_options']

data_encoded = df[cat_cols].apply(lambda x: pd.factorize(x)[0])

# Plot the correlation heatmap
plt.figure(figsize=(15, 10))
sns.heatmap(data_encoded.corr(), annot=True, cmap='coolwarm')
plt.title('Correlation Heatmap')
plt.show()
```



[126]:
```
# Plot the relationship between Work Interest and Social Weakness
plt.figure(figsize=(10, 5))
sns.countplot(x='Work_Interest', hue='Social_Weakness', data=df)
plt.title('Work Interest vs. Social Weakness')
plt.xlabel('Work Interest')
plt.ylabel('Count')
plt.show()
```

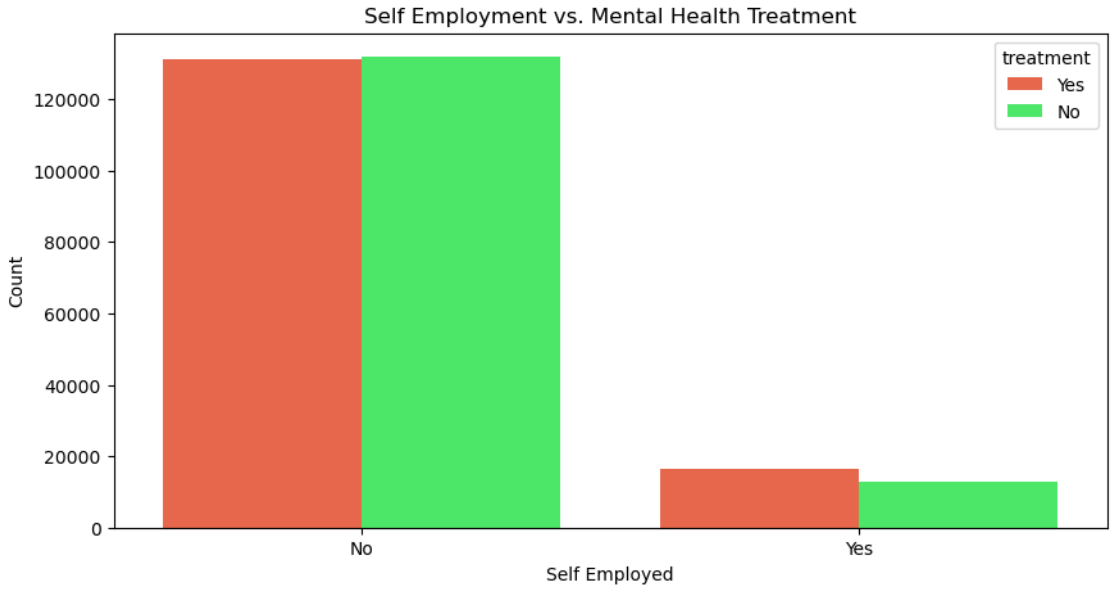


If the High work interest bar has a small segment of Yes (social weakness), it suggests that people highly interested in work are less likely to experience social weakness. Conversely, if the Low work interest bar has a large segment of Yes, it indicates that people with low work interest are more likely to experience social weakness.

[127]:
```
#Convert Columns to String Type

df['treatment'] = df['treatment'].astype(str)
df['Mood_Swings'] = df['Mood_Swings'].astype(str)
df['Coping_Struggles'] = df['Coping_Struggles'].astype(str)
```

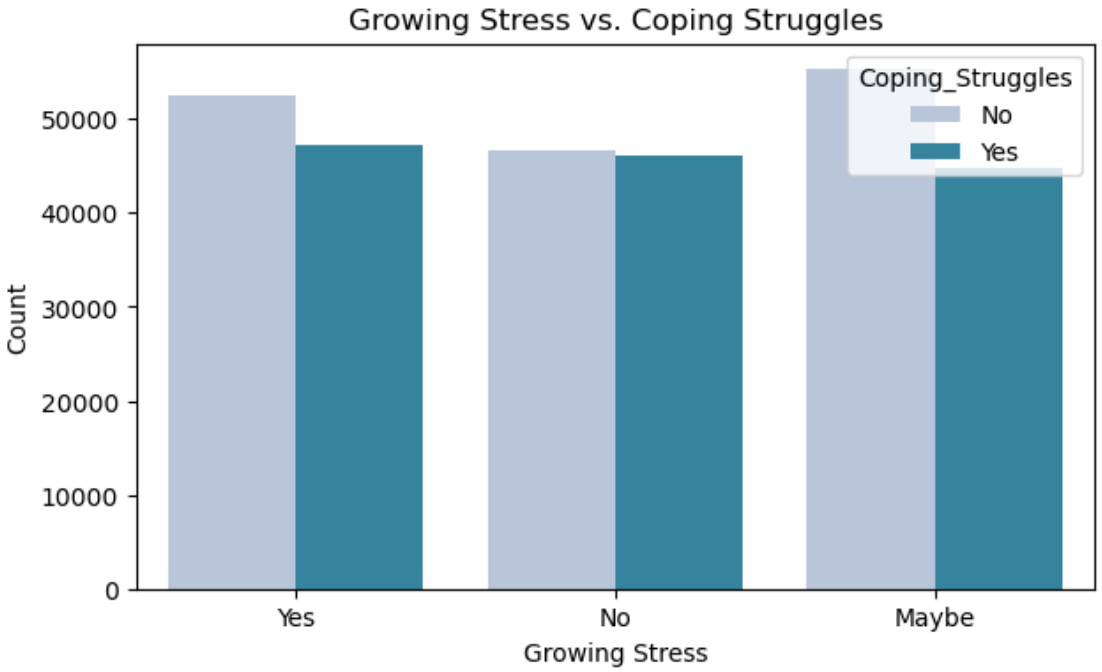
[128]:
```
#Fill Missing Values with a Placeholder

df['self_employed'] = df['self_employed'].fillna('Unknown')
df['treatment'] = df['treatment'].fillna('Unknown')
df['family_history'] = df['family_history'].fillna('Unknown')
df['Growing_Stress'] = df['Growing_Stress'].fillna('Unknown')
df['Coping_Struggles'] = df['Coping_Struggles'].fillna('Unknown')
```

[129]:
```
# Plot the relationship between Self Employment and Mental Health Treatment
plt.figure(figsize=(10, 5))
colors1 = ["#FF5733", "#33FF57"]
sns.countplot(x='self_employed', hue='treatment', data=df,palette = colors1)
plt.title('Self Employment vs. Mental Health Treatment')
plt.xlabel('Self Employed')
plt.ylabel('Count')
plt.show()
```

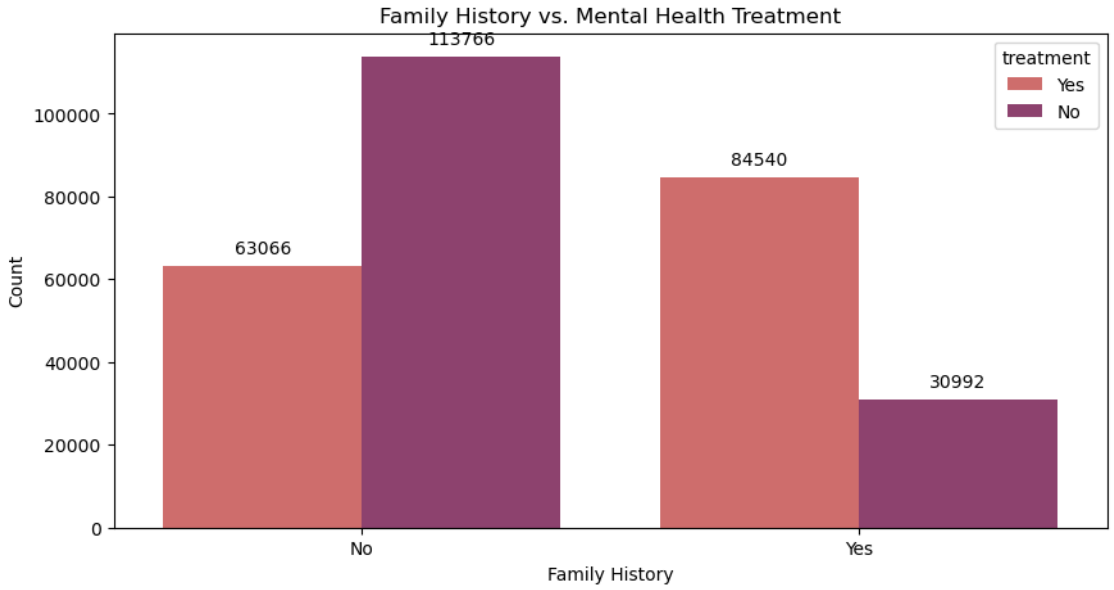


[130]:
```
# Plot the relationship between Growing Stress and Coping Struggles
plt.figure(figsize=(7,4))
ax3 = sns.countplot(x='Growing_Stress', hue='Coping_Struggles', data=df,␣
 ↪palette= 'PuBuGn')
plt.title('Growing Stress vs. Coping Struggles')
plt.xlabel('Growing Stress')
plt.ylabel('Count')
```

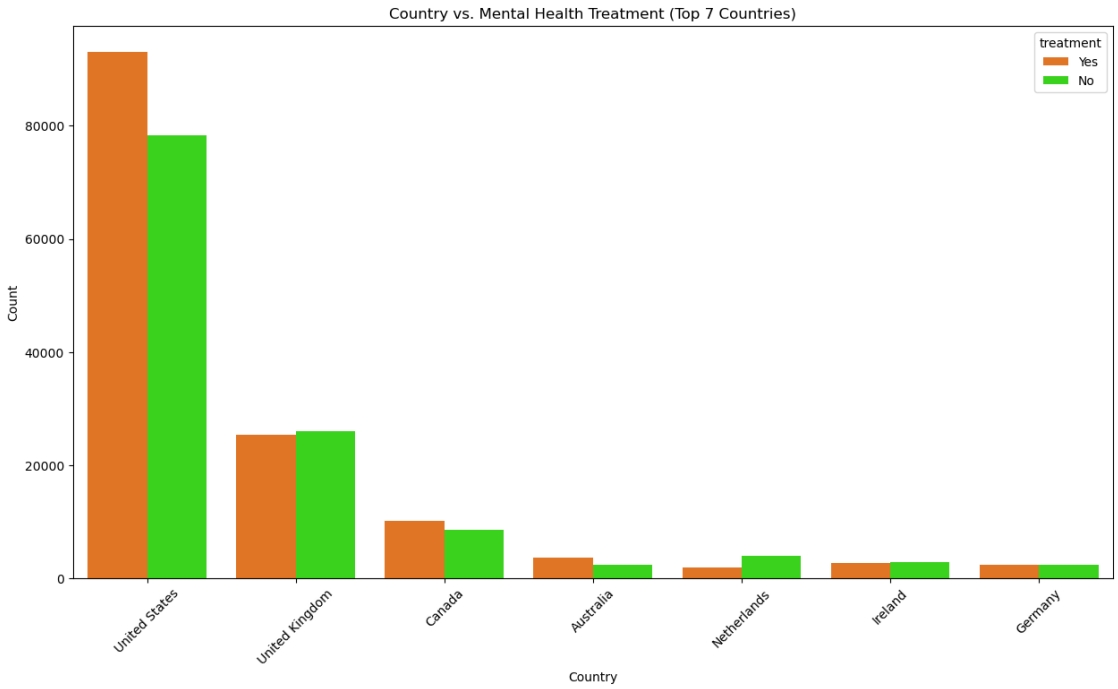
[130]:
```
Text(0, 0.5, 'Count')
```



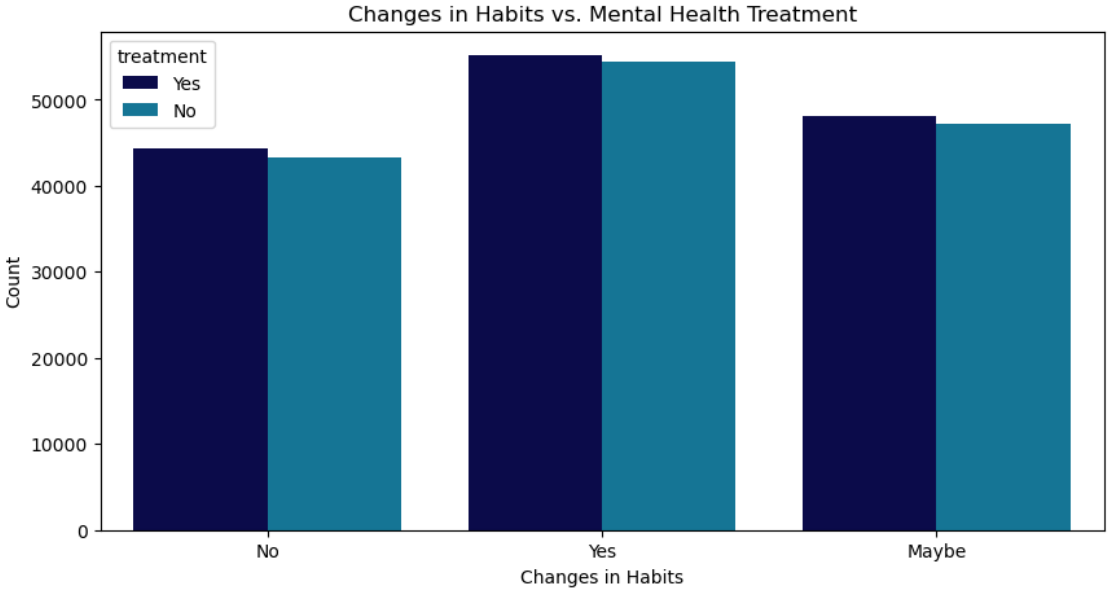
[131]:
```
# Plot the relationship between Family History and Mental Health Treatment
plt.figure(figsize=(10, 5))
ax2 = sns.countplot(x='family_history', hue='treatment', data=df,␣
 ↪palette='flare')
plt.title('Family History vs. Mental Health Treatment')
plt.xlabel('Family History')
plt.ylabel('Count')

# Add data labels to the bars in black color
for p in ax2.patches:
    ax2.annotate(format(p.get_height(), '.0f'),
                 (p.get_x() + p.get_width() / 2., p.get_height()),
                 ha = 'center', va = 'center',
                 xytext = (0, 10),
                 textcoords = 'offset points',
                 color='black')

plt.show()
```



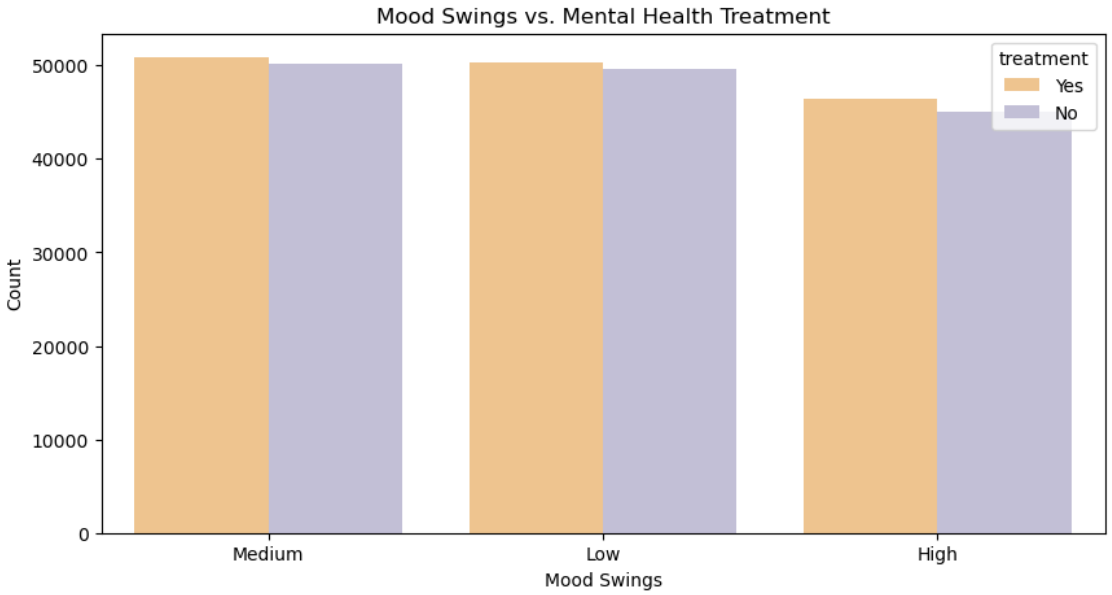
[132]:
```
# Get the top 7 countries based on the count
top_7_countries = df['Country'].value_counts().nlargest(7).index

# Plot the relationship between Country and Mental Health Treatment for the top␣
 ↪7 countries
plt.figure(figsize=(15, 8))
sns.countplot(x='Country', hue='treatment',␣
 ↪data=df,order=top_7_countries,palette = 'gist_ncar_r')
plt.title('Country vs. Mental Health Treatment (Top 7 Countries)')
plt.xlabel('Country')
plt.ylabel('Count')
plt.xticks(rotation=45)
plt.show()
```



[133]:
```
# Plot the relationship between Changes in Habits and Mental Health Treatment
plt.figure(figsize=(10, 5))
sns.countplot(x='Changes_Habits',hue='treatment', data=df ,palette = 'ocean')
plt.title('Changes in Habits vs. Mental Health Treatment')
plt.xlabel('Changes in Habits')
plt.ylabel('Count')
plt.show()
```

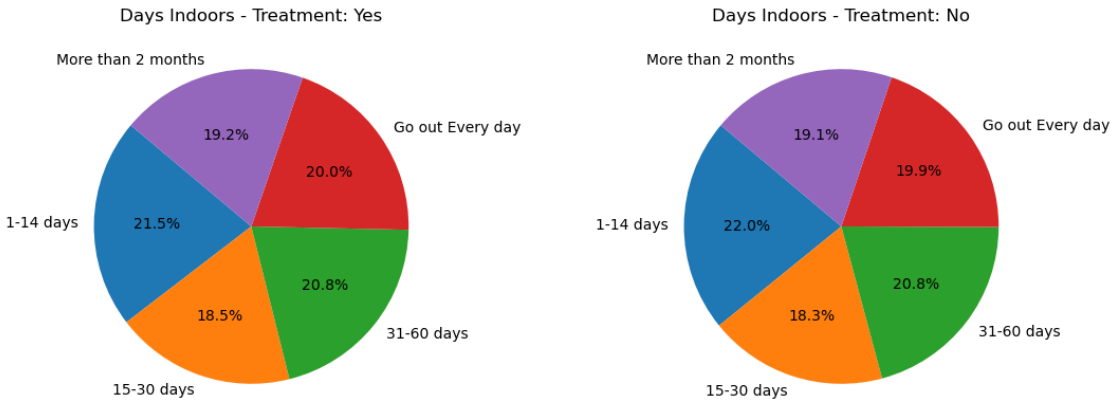


[134]:
```
# Plot the relationship between Mood Swings and Mental Health Treatment
plt.figure(figsize=(10, 5))
sns.countplot(x='Mood_Swings', hue='treatment', data=df,palette = 'PuOr')
plt.title('Mood Swings vs. Mental Health Treatment')
plt.xlabel('Mood Swings')
plt.ylabel('Count')
plt.show()
```

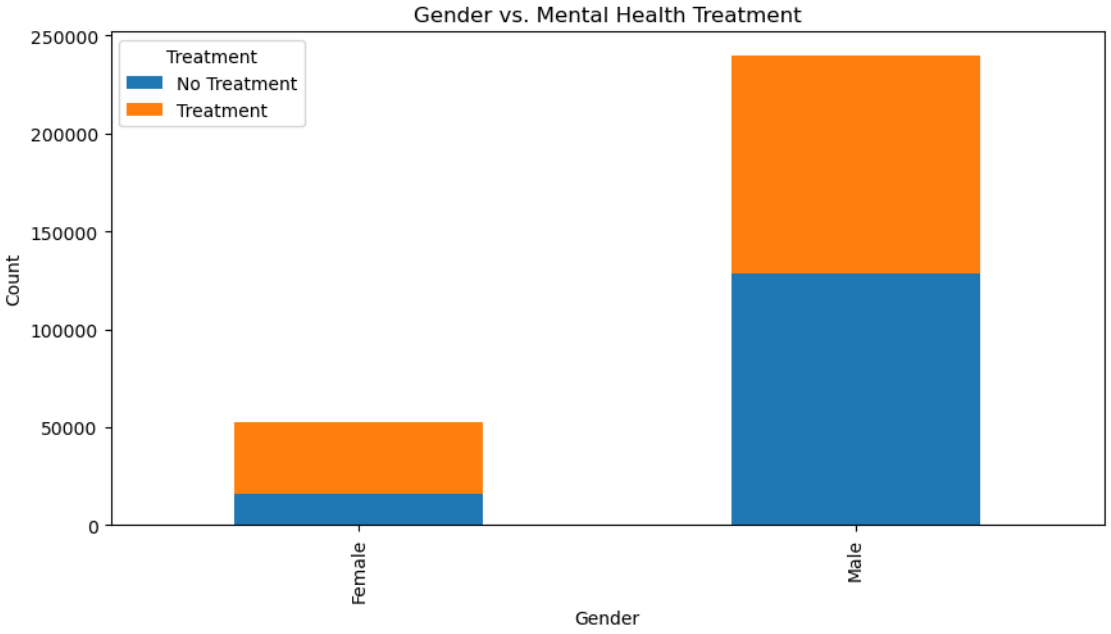


[135]:
```
# Aggregate the data
agg_data = df.groupby(['Days_Indoors', 'treatment']).size().
 ↪unstack(fill_value=0)

# Plot the pie chart
fig, axes = plt.subplots(1, 2, figsize=(12, 6), gridspec_kw={'wspace': 0.5})

# Plot for 'Yes' treatment
axes[0].pie(agg_data['Yes'], labels=agg_data.index, autopct='%1.1f%%',␣
 ↪startangle=140)
axes[0].set_title('Days Indoors - Treatment: Yes')

# Plot for 'No' treatment
axes[1].pie(agg_data['No'], labels=agg_data.index, autopct='%1.1f%%',␣
 ↪startangle=140)
axes[1].set_title('Days Indoors - Treatment: No')
```

```
# Add the main title below the plots
plt.figtext(0.5, 0.01, 'Days Indoors vs. Mental Health Treatment', ha='center',␣
 ↪fontsize=14)
plt.show()
```



[136]:
```
# Aggregate the data by Gender and treatment
agg_data = df.groupby(['Gender', 'treatment']).size().reset_index(name='counts')

# Pivot the data to have genders as rows and treatments as columns
pivot_data = agg_data.pivot(index='Gender', columns='treatment',␣
 ↪values='counts')

# Plot the stacked bar chart
pivot_data.plot(kind='bar', stacked=True, figsize=(10, 5))
plt.title('Gender vs. Mental Health Treatment')
plt.xlabel('Gender')
plt.ylabel('Count')
plt.legend(title='Treatment', labels=['No Treatment', 'Treatment'])
plt.show()
```



Analysis By: Shubham A

2 Thank you

[ ]: