In [10]:

```
%pip install pandas openai rouge-score tqdm
```

```
Requirement already satisfied: pandas in /opt/anaconda3/lib/python3.11/site-packages (2.1.4)
Requirement already satisfied: openai in /opt/anaconda3/lib/python3.11/site-packages (1.77.0)
Requirement already satisfied: rouge-score in /opt/anaconda3/lib/python3.11/site-packages (0.1.2)
Requirement already satisfied: tqdm in /opt/anaconda3/lib/python3.11/site-packages (4.65.0)
Requirement already satisfied: numpy<2,>=1.23.2 in /opt/anaconda3/lib/python3.11/site-packages (from pandas) (1.26.4)
Requirement already satisfied: python-dateutil>=2.8.2 in /opt/anaconda3/lib/python3.11/site-packages (from pandas) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in /opt/anaconda3/lib/python3.11/site-packages (from pandas) (2023.3.post1)
Requirement already satisfied: tzdata>=2022.1 in /opt/anaconda3/lib/python3.11/site-packages (from pandas) (2023.3)
Requirement already satisfied: anyio<5,>=3.5.0 in /opt/anaconda3/lib/python3.11/site-packages (from openai) (4.2.0)
Requirement already satisfied: distro<2,>=1.7.0 in /opt/anaconda3/lib/python3.11/site-packages (from openai) (1.8.0)
Requirement already satisfied: httpx<1,>=0.23.0 in /opt/anaconda3/lib/python3.11/site-packages (from openai) (0.28.1)
Requirement already satisfied: jiter<1,>=0.4.0 in /opt/anaconda3/lib/python3.11/site-packages (from openai) (0.9.0)
Requirement already satisfied: pydantic<3,>=1.9.0 in /opt/anaconda3/lib/python3.11/site-packages (from openai) (1.10.12)
Requirement already satisfied: sniffio in /opt/anaconda3/lib/python3.11/site-packages (from openai) (1.3.0)
Requirement already satisfied: typing-extensions<5,>=4.11 in /opt/anaconda3/lib/python3.11/site-packages (from openai) (4.13.2)
Requirement already satisfied: absl-py in /opt/anaconda3/lib/python3.11/site-packages (from rouge-score) (2.1.0)
Requirement already satisfied: nltk in /opt/anaconda3/lib/python3.11/site-packages (from rouge-score) (3.8.1)
Requirement already satisfied: six>=1.14.0 in /opt/anaconda3/lib/python3.11/site-packages (from rouge-score) (1.16.0)
Requirement already satisfied: idna>=2.8 in /opt/anaconda3/lib/python3.11/site-packages (from anyio<5,>=3.5.0->openai) (3.4)
Requirement already satisfied: certifi in /opt/anaconda3/lib/python3.11/site-packages (from httpx<1,>=0.23.0->openai) (2024.2.2)
Requirement already satisfied: httpcore==1.* in /opt/anaconda3/lib/python3.11/site-packages (from httpx<1,>=0.23.0->openai) (1.0.9)
Requirement already satisfied: h11>=0.16 in /opt/anaconda3/lib/python3.11/site-packages (from httpcore==1.*->httpx<1,>=0.23.0->openai) (0.16.0)
Requirement already satisfied: click in /opt/anaconda3/lib/python3.11/site-packages (from nltk->rouge-score) (8.1.7)
Requirement already satisfied: joblib in /opt/anaconda3/lib/python3.11/site-packages (from nltk->rouge-score) (1.2.0)
Requirement already satisfied: regex>=2021.8.3 in /opt/anaconda3/lib/python3.11/site-packages (from nltk->rouge-score) (2023.10.3)
Note: you may need to restart the kernel to use updated packages.
```

In [11]:

```python
# Cell 1: Imports and API Key Setup
import pandas as pd
import openai
from rouge_score import rouge_scorer
import time
import os
from tqdm.notebook import tqdm # Use tqdm.notebook for better notebook progress bars
import warnings

# --- OpenAI API Setup ---
# WARNING: If you save this notebook and share it, your API key will be visible.
# It's better to use a .env file (see Option 2) or input() for shared notebooks.
# For personal use where the notebook isn't shared widely, this is convenient.

# --- REPLACE WITH YOUR ACTUAL KEY, ORG ID, AND PROJECT ID ---
api_key_value = "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"
org_id_value = "org-xwnyLWKd2QBruMFmhMFJeSU0"
project_id_value = "proj_TWJIBSkEnUAiZ5WG1ZfVbvFa" # Project ID is less commonly needed for basic API calls

# Set them as environment variables for the current Python process
os.environ["OPENAI_API_KEY"] = api_key_value
os.environ["OPENAI_ORG_ID"] = org_id_value
if project_id_value: # Only set if you have one and it's relevant
    os.environ["OPENAI_PROJECT_ID"] = project_id_value

# Initialize the OpenAI client. It will pick up the environment variables.
try:
    client = openai.OpenAI()
    # Perform a simple test call to verify authentication (optional but good for debugging)
    # client.models.list()
    # print("OpenAI client initialized and authenticated successfully.")
except Exception as e:
    print(f"Error initializing OpenAI client: {e}")
    warnings.warn("OpenAI client might not be properly authenticated. Check your API key and organization ID.")

# --- Configuration ---
CSV_FILE_PATH = 'reddit_advice_dataset.csv' # Make sure this file is in the same directory as your notebook, or provide the full path
OUTPUT_CSV_FILE_PATH = 'reddit_advice_chatgpt_rouge_scores_notebook.csv'

# !!! IMPORTANT: Inspect your CSV and set these column names correctly !!!
PROMPT_COLUMN_NAME = 'question'  # Replace with the actual column name for the user's prompt
HUMAN_ADVICE_COLUMN_NAME = 'suggestion' # Replace with the actual column name for human advice

OPENAI_MODEL = "gpt-4o-mini"
MAX_TOKENS_RESPONSE = 250
TEMPERATURE = 0.7
```

In [12]:

```python
# Cell 2: Helper Function for ChatGPT
def get_chatgpt_advice(prompt_text):
    """Generates advice from ChatGPT for a given prompt."""
    try:
        response = client.chat.completions.create( # Use the client initialized in the previous cell
            model=OPENAI_MODEL,
            messages=[
                {"role": "system", "content": "You are a helpful assistant providing advice."},
                {"role": "user", "content": f"Please provide advice for the following situation: {prompt_text}"}
            ],
            max_tokens=MAX_TOKENS_RESPONSE,
            temperature=TEMPERATURE
        )
        return response.choices[0].message.content.strip()
    except Exception as e:
        print(f"Error calling OpenAI API for prompt '{prompt_text[:50]}...': {e}")
        return None
```

In [13]:

```python
# Cell 3: Main Processing Logic
def main_notebook_processing():
    # Load the dataset
    try:
        df = pd.read_csv(CSV_FILE_PATH)
    except FileNotFoundError:
        print(f"Error: CSV file not found at {CSV_FILE_PATH}")
        print("Please ensure 'reddit_advice_dataset.csv' is in the same directory as the notebook or provide the full path.")
        return

    print(f"Loaded {len(df)} prompts from {CSV_FILE_PATH}")

    # Initialize ROUGE scorer
    scorer = rouge_scorer.RougeScorer(['rouge1', 'rouge2', 'rougeL'], use_stemmer=True)

    results = []

    print(f"Generating ChatGPT responses and calculating ROUGE scores using {OPENAI_MODEL}...")
    # Use tqdm.notebook for a nice progress bar in the notebook
    for index, row in tqdm(df.iterrows(), total=df.shape[0], desc="Processing Prompts"):
        prompt_text = row[PROMPT_COLUMN_NAME]
        human_advice_text = str(row[HUMAN_ADVICE_COLUMN_NAME])

        if pd.isna(prompt_text) or pd.isna(human_advice_text) or not human_advice_text.strip():
            print(f"Skipping row {index+1} due to missing prompt or human advice.")
            results.append({
                'prompt': prompt_text,
                'human_advice': human_advice_text,
                'chatgpt_advice': "SKIPPED_EMPTY_INPUT",
                'rouge1_f': 0, 'rouge1_p': 0, 'rouge1_r': 0,
                'rouge2_f': 0, 'rougeL_f': 0
            })
            continue

        chatgpt_advice_text = get_chatgpt_advice(prompt_text)

        if chatgpt_advice_text:
            rouge_scores_dict = scorer.score(target=human_advice_text, prediction=chatgpt_advice_text)
            results.append({
                'prompt': prompt_text,
                'human_advice': human_advice_text,
                'chatgpt_advice': chatgpt_advice_text,
                'rouge1_f': rouge_scores_dict['rouge1'].fmeasure,
                'rouge1_p': rouge_scores_dict['rouge1'].precision,
                'rouge1_r': rouge_scores_dict['rouge1'].recall,
                'rouge2_f': rouge_scores_dict['rouge2'].fmeasure,
                'rougeL_f': rouge_scores_dict['rougeL'].fmeasure
            })
        else:
            results.append({
                'prompt': prompt_text,
                'human_advice': human_advice_text,
                'chatgpt_advice': "ERROR_GENERATING_RESPONSE",
                'rouge1_f': 0, 'rouge1_p': 0, 'rouge1_r': 0,
                'rouge2_f': 0, 'rougeL_f': 0
            })

        # time.sleep(0.2) # Optional: slight delay if you encounter rate limits

    results_df = pd.DataFrame(results)
    results_df.to_csv(OUTPUT_CSV_FILE_PATH, index=False)
    print(f"\nResults saved to {OUTPUT_CSV_FILE_PATH}")

    if not results_df.empty:
        # Filter out rows where ROUGE scores might be 0 due to errors/skips for accurate averaging
        valid_scores_df = results_df[results_df['chatgpt_advice'] != "ERROR_GENERATING_RESPONSE"]
        valid_scores_df = valid_scores_df[valid_scores_df['chatgpt_advice'] != "SKIPPED_EMPTY_INPUT"]

        if not valid_scores_df.empty:
            avg_rouge1_f = valid_scores_df['rouge1_f'].mean()
            avg_rouge2_f = valid_scores_df['rouge2_f'].mean()
            avg_rougeL_f = valid_scores_df['rougeL_f'].mean()
            print("\nAverage ROUGE F1-Scores (for successfully processed prompts):")
            print(f"  ROUGE-1: {avg_rouge1_f:.4f}")
            print(f"  ROUGE-2: {avg_rouge2_f:.4f}")
            print(f"  ROUGE-L: {avg_rougeL_f:.4f}")
        else:
            print("\nNo prompts were successfully processed to calculate average ROUGE scores.")

# Call the main processing function
main_notebook_processing()
```

```
Loaded 224 prompts from reddit_advice_dataset.csv
Generating ChatGPT responses and calculating ROUGE scores using gpt-4o-mini...
Processing Prompts:   0%|          | 0/224 [00:00<?, ?it/s]
Results saved to reddit_advice_chatgpt_rouge_scores_notebook.csv

Average ROUGE F1-Scores (for successfully processed prompts):
  ROUGE-1: 0.1849
  ROUGE-2: 0.0249
  ROUGE-L: 0.0975
```

In [1]:

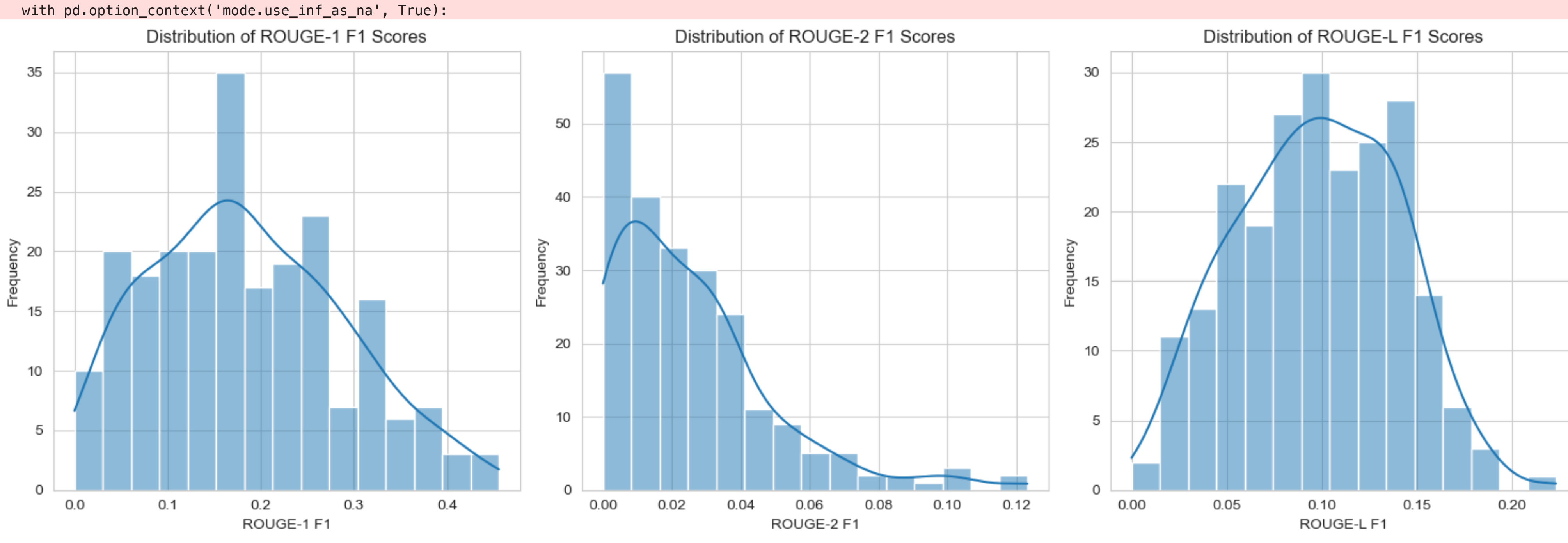
```python
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

# Load the results data again (make sure the path is correct)
try:
    results_df = pd.read_csv('reddit_advice_chatgpt_rouge_scores_notebook.csv')
    # Filter out any rows where generation failed, if they weren't already excluded during saving
    results_df_valid = results_df[results_df['chatgpt_advice'].notna() &
                                  ~results_df['chatgpt_advice'].isin(["ERROR_GENERATING_RESPONSE", "SKIPPED_EMPTY_INPUT"])].copy()

    # Convert score columns to numeric, coercing errors (just in case)
    score_cols = ['rouge1_f', 'rouge1_p', 'rouge1_r', 'rouge2_f', 'rougeL_f']
    for col in score_cols:
        results_df_valid[col] = pd.to_numeric(results_df_valid[col], errors='coerce')

    # Drop rows where scores couldn't be converted (if any)
    results_df_valid.dropna(subset=score_cols, inplace=True)

    print(f"Loaded and cleaned data for visualization: {len(results_df_valid)} valid entries.")

except FileNotFoundError:
    print("Error: Output CSV file not found. Make sure 'reddit_advice_chatgpt_rouge_scores_notebook.csv' exists.")
    results_df_valid = pd.DataFrame() # Create empty df to avoid errors later

# Set a nice style for the plots
sns.set_style("whitegrid")
```

```
Loaded and cleaned data for visualization: 224 valid entries.
```

In [2]:

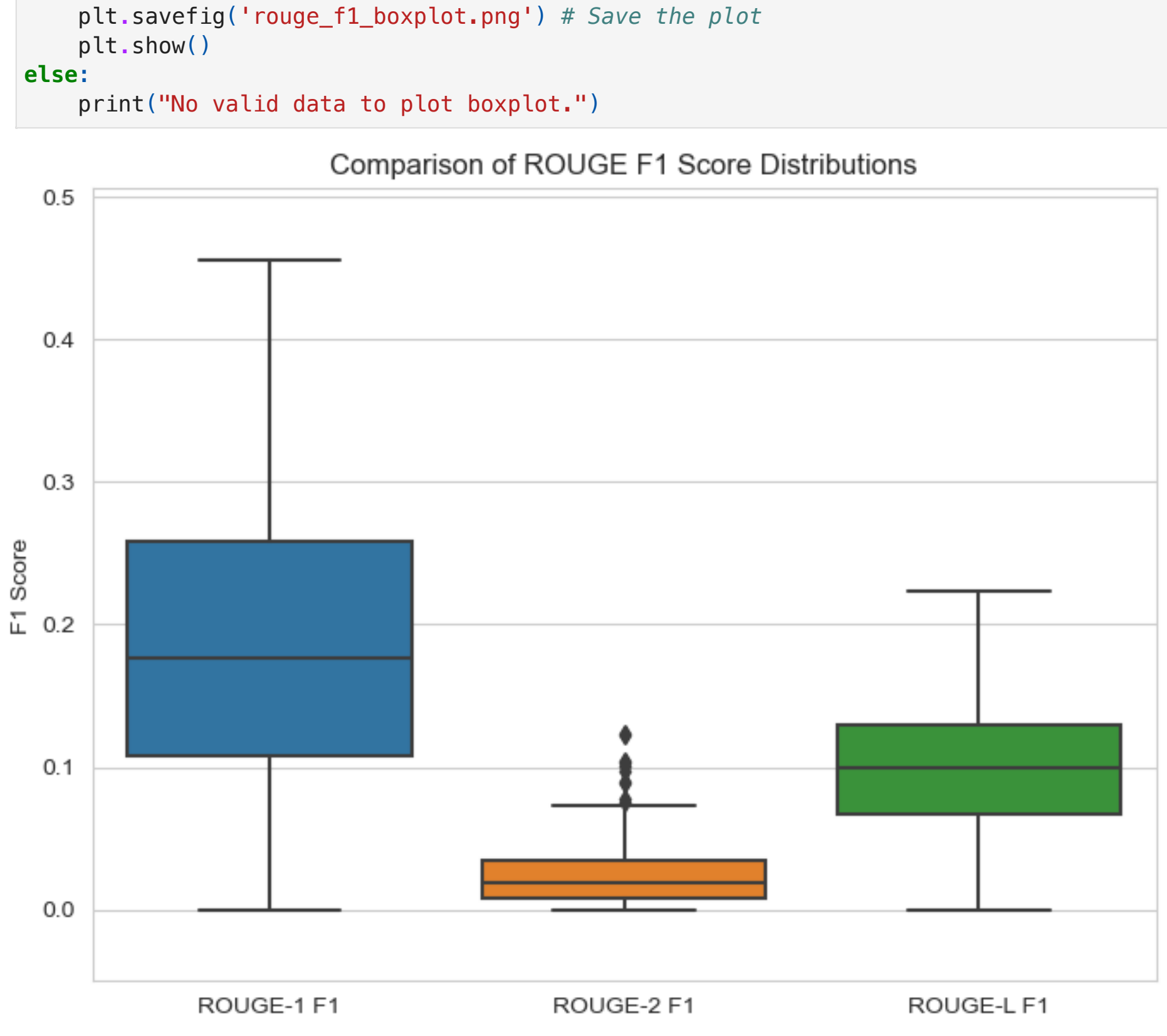
```python
# Cell for Histograms
if not results_df_valid.empty:
    plt.figure(figsize=(15, 5))

    plt.subplot(1, 3, 1)
    sns.histplot(results_df_valid['rouge1_f'], bins=15, kde=True)
    plt.title('Distribution of ROUGE-1 F1 Scores')
    plt.xlabel('ROUGE-1 F1')
    plt.ylabel('Frequency')

    plt.subplot(1, 3, 2)
    sns.histplot(results_df_valid['rouge2_f'], bins=15, kde=True)
    plt.title('Distribution of ROUGE-2 F1 Scores')
    plt.xlabel('ROUGE-2 F1')
    plt.ylabel('Frequency')

    plt.subplot(1, 3, 3)
    sns.histplot(results_df_valid['rougeL_f'], bins=15, kde=True)
    plt.title('Distribution of ROUGE-L F1 Scores')
    plt.xlabel('ROUGE-L F1')
    plt.ylabel('Frequency')

    plt.tight_layout()
    plt.savefig('rouge_f1_distributions.png') # Save the plot
    plt.show()
else:
    print("No valid data to plot histograms.")
```

```
/opt/anaconda3/lib/python3.11/site-packages/seaborn/_oldcore.py:1119: FutureWarning: use_inf_as_na option is deprecated and will be removed in a future version. Convert inf values to NaN bef
ore operating instead.
  with pd.option_context('mode.use_inf_as_na', True):
/opt/anaconda3/lib/python3.11/site-packages/seaborn/_oldcore.py:1119: FutureWarning: use_inf_as_na option is deprecated and will be removed in a future version. Convert inf values to NaN bef
ore operating instead.
  with pd.option_context('mode.use_inf_as_na', True):
/opt/anaconda3/lib/python3.11/site-packages/seaborn/_oldcore.py:1119: FutureWarning: use_inf_as_na option is deprecated and will be removed in a future version. Convert inf values to NaN bef
ore operating instead.
  with pd.option_context('mode.use_inf_as_na', True):
```



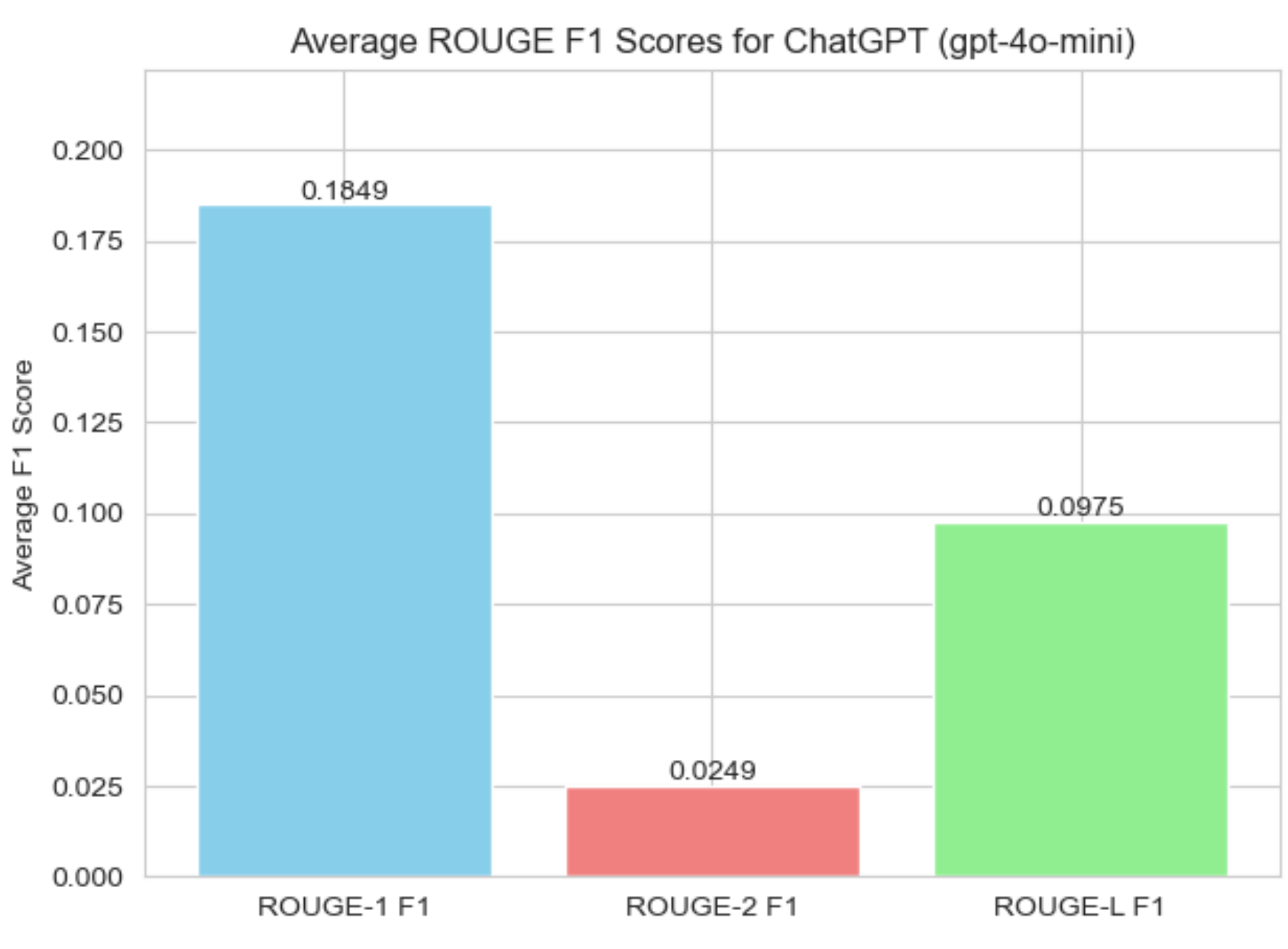
In [3]:

```python
# Cell for Box Plot
if not results_df_valid.empty:
    # Select only the F1 scores for the box plot
    f1_scores_df = results_df_valid[['rouge1_f', 'rouge2_f', 'rougeL_f']]
    # Rename columns for clarity in the plot
    f1_scores_df.columns = ['ROUGE-1 F1', 'ROUGE-2 F1', 'ROUGE-L F1']

    plt.figure(figsize=(8, 6))
    sns.boxplot(data=f1_scores_df)
    plt.title('Comparison of ROUGE F1 Score Distributions')
    plt.ylabel('F1 Score')
    plt.ylim(bottom=min(f1_scores_df.min().min() - 0.05, 0), top=max(f1_scores_df.max().max() + 0.05, 0.5)) # Adjust ylim if needed
    plt.savefig('rouge_f1_boxplot.png') # Save the plot
    plt.show()
else:
    print("No valid data to plot boxplot.")
```



In [4]:

```python
# Cell for Bar Chart of Averages
if not results_df_valid.empty:
    avg_scores = {
        'ROUGE-1 F1': results_df_valid['rouge1_f'].mean(),
        'ROUGE-2 F1': results_df_valid['rouge2_f'].mean(),
        'ROUGE-L F1': results_df_valid['rougeL_f'].mean()
    }

    metrics = list(avg_scores.keys())
    values = list(avg_scores.values())

    plt.figure(figsize=(7, 5))
    bars = plt.bar(metrics, values, color=['skyblue', 'lightcoral', 'lightgreen'])
    plt.ylabel('Average F1 Score')
    plt.title('Average ROUGE F1 Scores for ChatGPT (gpt-4o-mini)')
    plt.ylim(0, max(values) * 1.2) # Adjust ylim to give some space

    # Add the value labels on top of the bars
    for bar in bars:
        yval = bar.get_height()
        plt.text(bar.get_x() + bar.get_width()/2.0, yval, f'{yval:.4f}', va='bottom', ha='center') # Add text label

    plt.savefig('average_rouge_scores_bar.png') # Save the plot
    plt.show()
else:
    print("No valid data to plot average score bar chart.")
```



In [ ]: