Caffeine and having an energetic day were always connected and perceived as sometimes we can't have a normal day without a caffeinated drink, it has been a field for a lot of research and a field of interest. Caffeine activates noradrenaline neurons and seems to affect the local release of dopamine. Many pf the alerting effects of caffeine may be related to the action of the methylxanthine on serotonin neurons[1].

The methylxanthine are a purine-derived group of pharmacologic agents that have clinical use because of their broncho-dilating and stimulatory effects[2]. Now we can understand that caffeine is a neuro-stimulate that is widely used, and helps in being active and energetic but what about after a long day and going back to sleep. How easy is it to get back to sleep and how does caffeine effect our sleep patterns, specially that caffeinated drinks are widely consumed by teenagers and young adults.

It has been found that 400 mg of caffeine administered at three 3 points administered prior to their participants usual bedtime, and found that doses even 6 hours prior to bedtime significantly disturbed sleep compared to placebos[3]. In another study using the same amount of caffeine suggested that caffeine taken 0,3 or even 6 hours prior to bedtime significantly disrupts sleep. Even at 6 hours, caffeine reduced sleep by more than one hour[4]. This degree of sleep loss, if experienced over multiple nights may have detrimental effects on daytime function[5]. Caffeine shifted rapid eye movement to the early part of the night and stages 3 and 4 to the latter end of the (shortened) sleep period[6]. This signifies the relationship between caffeine and sleep disturbance patterns.
The NREM sleep deprivation reduces the normal release of specific neurotransmitters, which can affect the ability of the receptors to refresh and restore sensitivity. Without these stages of sleep, the result is reduced cognition[7]. Interestingly the effects of caffeine when consumed in large amount can improve the next day performance by preventing the effects of overnight withdrawal rather than representing a net benefit.

Some adaptation to the metabolic and sleep efficiency effects of caffeine was seen over the week of administration, and withdrawal symptoms from headaches, dizziness and sleepiness during the day. High dependence on caffeine is also related to high consumption and different signs of tolerance. This emphasizes on the effects of sleep deprivation and its psychological effects.

After mentioning these factors it's important to understand that caffeine is a drug, and it has its side-effects and benefits. Recently with the spread of social media, it's widely talked about that people can't go through their days without multiple cups of coffee and buying large cups of caffeinated drinks per day, this results in dependence and high tolerance on caffeine.

I think that this is a serious problem since caffeine is related to disturbance of sleep patterns as discussed earlier. A **solution** to the problem might be achieved by limiting the consumption of caffeine and making it less attractive is a much to reduce the social dependency on it. Taxing and media pushing in the way of moderate consumption could be a solution towards this problem, especially energy drinks and sodas which have other additives that makes them even unhealthier but attractive to young adults and teenagers. Prohibiting energy drinks and sodas for young teenagers might be a good idea to prevent early dependence on caffeine.

The stakeholders in this case are:

1. Caffeine users
2. Schools
3. Psychiatrists
4. Media
5. Policy makers (taxation and pricing of caffeinated drinks)

The case here is an AI made csv file describing a group of people with a minimum age of 15 years old to a maximum of 55-year-old, that were randomly made with randomized patterns. Conditions were made about the possible amount of drinks consumptions per week, but also not fully generalized to the whole specimen to allow randomness. The dataset was created by mockaroo.com, the website used Ruby syntax to allow for conditions to be made from one variable to another. Chat gpt was used to help with the code writing.

```
if coffee > 10 then "sleep == 6"
elsif tea > 5 then "sleep ==7"      example of ruby syntax
etc …
```

After the file was made, and added to a file on the desktop. R studio was used to represent this dataset.

The first step was to load the necessary packages and this was done simply by downloading them from the plots, packages and help pane and 'calling' them using the {library} function. The downloaded packages were pacman, ggplot2, and shiny.

After importing the csv file to r studio by using the environment plane. To start the process of data visualization and noticing that the csv file doesn't have any empty fields or repetitions no cleaning was needed, then the ggplot2 package was used to implement different line graphs for the variables. The variables used in the data visualization were cups of coffee (per week), cups of tea per week, cans of energy drinks per week, cans of soda per week all against average hours of sleep. These variables were all used in the same way in the remaining visualizations.

The next step was making the shiny page, in the beginning after multiple trials there was a constant error of object not found when starting the shiny page, which was solved by using "colnames" and copy pasting the column names as they are. Then the problem still persisted and later I came to find out that my file path was written in "\" rather than "/" and fixing this solved the problem. After the shiny preview was successfully shown on the local, a shiny account was made, and the publishing to the shiny webpage failed and unfortunately couldn't be solved, using ChatGPT and asking for help suggested that the shiny webpage cannot read the file directory as a whole, but only in the read_csv function the csv file was to be written but even after doing that the error persisted stating "Paths should be to files within the project directory" this was not solved. Then finally a correlation file was made using after extracting the variables and "correlation <- cor ()" and instructions to print the correlation between the two variables.

Correlation between cups of coffee and average hours of sleep per week: -0.958696766314308

This shows the increase of coffee consumption has decreased sleep hours on average

Correlation between cups of tea and average hours of sleep per week: 0.00876281664681643

This shows the weak relationship between tea consumption and sleep hours

Correlation between cans of energy and average hours of sleep per week: 0.0453360095733247

A very weak positive correlation between the two variables

Correlation between cans of soda and average hours of sleep per week: 0.163554134169694
A weak positive correlations between two variables

All the files were uploaded to GitHub repository: https://github.com/MahmoudSalih96/projectsleepvscaffieneMahmoudSalih

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