

**THE ASSOCIATION BETWEEN CAFFEINE
CONSUMPTION, PERCEIVED COGNITIVE FUNCTION
AND ACADEMIC PERFORMANCE AMONG THE
UNIVERSITY STUDENTS AT UNIVERSITI SAINS
MALAYSIA, HEALTH CAMPUS**

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UNIVERSITI SAINS MALAYSIA**

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by

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**Dissertation submitted in partial fulfilment of the
requirements for the degree of Bachelor of Health Science
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LIST OF ABBREVIATIONS

CC	Caffeine Consumption
CF	Cognitive Function
PAF	Perceived Cognitive Function
AP	Academic Performance
CCQ	Caffeine Consumption Questionnaire
CC-APQ	Caffeine Consumption Effects on Perceived Cognitive Function and Academic Performance Questionnaire
IQ	Intelligence Quotient
GPA	Grade Point Average
CNS	Central Nervous System

**ASSOCIATION BETWEEN CAFFEINE CONSUMPTION, PERCEIVED
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UNIVERSITY STUDENTS AT UNIVERSITI SAINS MALAYSIA**

ABSTRACT

Caffeine consumption is a common practice among university students to enhance alertness, concentration and learning performance. However, evidence regarding the association between caffeine consumption, perceived cognitive function, and academic performance remains inconsistent. Therefore, this study aimed to determine the association between caffeine consumption, perceived cognitive function, and academic performance among undergraduate university students from the School of Health Sciences (PPSK), School of Medical Sciences (PPSP) and School of Dental Sciences (PPSG) at Universiti Sains Malaysia, Health Campus. This cross-sectional study involved 105 students selected through stratified and convenience sampling methods. Data were collected using a structured questionnaire consisting of socio-demographic information, academic performance results (CGPA), caffeine consumption patterns, perceived cognitive function, and perceived academic performance. The data were analysed using IBM SPSS Statistics Version 31.0 through descriptive statistics and the Chi-square test at a significance level of $p < 0.05$. The findings showed that most respondents consumed caffeine at relatively low frequencies, with one cup per day being the most common intake pattern. The majority of respondents demonstrated moderate levels of perceived cognitive function and perceived academic performance, while all respondents achieved passing academic results. A statistically significant association was found between the frequency of caffeine consumption and perceived cognitive function ($p = 0.019$), as well as between

the frequency of caffeine consumption and perceived academic performance ($p = 0.014$). In conclusion, moderate caffeine consumption may be associated with positive perceptions of both cognitive function and academic performance among undergraduate students.

**HUBUNGAN ANTARA PENGAMBILAN KAFEIN, PERSEPSI FUNGSI
KOGNITIF DAN PRESTASI AKADEMIK DALAM KALANGAN PELAJAR
UNIVERSITI DI UNIVERSITI SAINS MALAYSIA**

ABSTRAK

Pengambilan kafein merupakan amalan biasa dalam kalangan pelajar universiti bagi meningkatkan tahap kewaspadaan, tumpuan dan prestasi pembelajaran. Walau bagaimanapun, bukti mengenai hubungan antara pengambilan kafein, persepsi fungsi kognitif dan prestasi akademik masih tidak konsisten. Oleh itu, kajian ini bertujuan untuk menentukan hubungan antara pengambilan kafein, persepsi fungsi kognitif dan prestasi akademik dalam kalangan pelajar prasiswazah dari Pusat Pengajian Sains Kesihatan (PPSK), Pusat Pengajian Sains Perubatan (PPSP) dan Pusat Pengajian Sains Pergigian (PPSG), Universiti Sains Malaysia (USM), Kampus Kesihatan. Kajian keratan rentas ini melibatkan seramai 105 orang pelajar yang dipilih menggunakan kaedah persampelan berstrata dan persampelan mudah. Data dikumpulkan menggunakan soal selidik berstruktur yang mengandungi maklumat sosiodemografi, keputusan prestasi akademik (CGPA), corak pengambilan kafein, persepsi terhadap fungsi kognitif dan prestasi akademik. Data dianalisis menggunakan perisian IBM SPSS Statistics Version 31.0 dengan menggunakan statistik deskriptif dan ujian Chi-square pada aras signifikan $p < 0.05$. Hasil kajian ini menunjukkan bahawa kebanyakan responden mengambil kafein pada kekerapan yang rendah, dengan satu cawan sehari merupakan corak pengambilan yang paling kerap.

Majoriti responden menunjukkan tahap persepsi fungsi kognitif dan prestasi akademik yang sederhana, manakala semua responden memperoleh keputusan akademik lulus.

Hubungan signifikan secara statistik didapati antara kekerapan pengambilan kafein dan persepsi fungsi kognitif ($p = 0.019$), serta antara kekerapan pengambilan kafein dan persepsi terhadap prestasi akademik ($p = 0.014$). Kesimpulannya, pengambilan kafein secara sederhana mungkin berkait dengan persepsi yang lebih baik terhadap fungsi kognitif dan prestasi akademik dalam kalangan pelajar prasiswazah.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

University life often involves with stressful academic situations with high workloads, especially during examination periods (Alqawasmi et al., 2024; Bonanni et al., 2022; Faezah Jamal & Idham Abu Hasan, 2024). Commonly to overcome the stressful, university students often consume caffeine to stay awake, to focus during a lectures and to meet academic deadlines. Caffeine is one of the most widely consumed psychoactive substances in the world. It acts as a Central Nervous System (CNS) stimulant and is mainly found in coffee, tea, energy drinks, and chocolate (Tahir et al., 2022). Due to its stimulating effects on CNS, caffeine is frequently consumed by individuals who want to stay awake, enhance concentration and reduce fatigue by blocking the receptors for adenosine, which is a neurotransmitter that promotes drowsiness and sleep (Akosua et al., 2023). According to Faezah Jamal (2024), there's research shown that 90% of students consumes caffeine, and most of them consume it less than seven servings per week which indicates that university students who are studying shows strong caffeine consumption habits.

For them, caffeine consumption (CC) has a crucial impact on student's learning process. It has become one of the most popular alternative methods among the university student to stay alert and focused during lectures, late-night study sessions, deal with academic pressure and social demands (Faezah Jamal, 2024). Not only that, most of the students also rely on caffeinated beverages in order to extend study hours, meet assignment deadlines, and prepare for examinations. This habits of CC are prevalent among university students, who often use caffeine to help them concentrate better and

perform well academically (Faezah Jamal & Idham Abu Hasan, 2024). There are also several studies have shown the fact that most university students cope with stressful academic situations by drinking a lot of caffeinated beverages (Faezah Jamal & Idham Abu Hasan, 2024). There is study that have reported CC can improve cognitive performance, energy levels, enhance productivity of an individuals and mood during study sessions (Viado, 2024). However, excessive consumption of caffeine may lead to adverse effects such as insomnia, anxiety, daytime sleepiness, poor academic performance, and more serious cardiovascular problems (Faezah Jamal, 2024).

Cognitive functions (CF) refer to the mental processes that allow individuals to acquire, process, store, and apply knowledge through thinking, experience, and learning (Dhakal & Bobrin, 2023). These functions include attention, memory, perception, problem-solving, reasoning, and decision-making, which are essential for daily activities and academic performance (Dhakal & Bobrin, 2023). Caffeine containing products are typically used to enhance alertness, manage stress, and improve concentration and cognitive performance (Sadik et al., 2025). Meanwhile, perceived cognitive function (PCF) refers to an individual's self-reported perception of their mental abilities, including attention, memory, concentration and problem-solving rather than objectively measured cognitive performance (Rabin et al., 2023). PCF does not require cognitive assessments that needs standardized neuropsychological tests and it only reflects how the individuals evaluate their own cognitive abilities in daily activities (Rabin et al., 2023).

Academic performance (AP) is a key indicator for a student success in life that can be influenced by multiple factors including study habits, sleep quality, stress levels, and dietary choices (Mulaudzi, 2023). That can be assess through frequency of class attendance, study habits, ability to focus or concentrate during class sessions, sleep quality especially during examination periods and the use of caffeine before study or

exams. During the academic journeys, university students are often face with various kinds of challenges and stress, especially during examinations periods (Hawamdeh et al., 2024). As a coping mechanism, a significant number of students consumes caffeinated products believing that it could help enhance their focus, boost memory and improve AP (Hawamdeh et al., 2024). Although some studies have reported that caffeine intake can enhance cognitive performance, other findings suggest that excessive or late-night consumption may impair academic outcomes due to reduced sleep quality and increased fatigue.

There are numerous studies that have investigated the association between caffeine consumption and academic performance worldwide. However, in Malaysia, caffeine consumption is common among university students, yet research on its relationship with perceived cognitive function and academic performance remains limited, particularly within USM.

1.2 PROBLEM STATEMENT

Caffeine consumption (CC) is one of the most commonly consumed stimulants among the university students and widely used to increase alertness, improve concentration and cope with academic demands (Sami Khan et al., 2017), especially during the periods of intense academic workloads such as examinations. Even though moderate intake may provide short-term cognitive benefits, excessive or poorly timed consumption has been linked to negative effects such as insomnia, anxiety, and poor concentration, which could ultimately impact academic performance (Faezah Jamal, 2024).

According to many other previous studies such as Hawamdeh et al. (2024) and Akosua et al. (2023), they suggest the fact that caffeine gives out many kinds of benefits especially for focus, wakefulness and also productivity. Thus, these shows that the studies regarding association of caffeine consumption on academic performance is inconsistent in research and were also mixed up between positive and negative outcomes (Akosua et al., 2023; Bonanni et al., 2022; Faezah Jamal, 2024; Hawamdeh et al., 2024; Viado, 2024).

Caffeine consumption has been shown to improve cognitive performance, including attention, memory and reaction time but these are all depends on the individual tolerance, genetic factors, and habitual consumption levels and other varying factors such as like dose, timing and other lifestyle factors like sleep, diet, and stress (Akosua et al., 2023). However, according to a study by Bonanni et al. (2022), under the academic performance outcome section, the authors seem to focus and emphasized more on the negative impacts of caffeine consumption on learning, memory and sleep duration. Bonanni et al. (2022) mentioned that a high amount of caffeine intake may increase irritability and fatigue, which can eventually impair student's ability to learn. Despites its widespread use of caffeine, most of the previous research regarding the associations between caffeine consumptions and academic performance has produced mixed results and remain inconclusive and unclear in the literature. Some studies have suggested that caffeine consumption has the ability to enhance cognitive and academic performance but also presents potential risks related to coffee-dependency (Viado, 2024). Based on other research, Faezah Jamal (2024) also stated and reports potential negative consequences in excessive caffeine consumption such as poor sleep quality, anxiety and increased daytime sleepiness and fatigue which may hinder the students learning and academic achievement. Despite widespread use of caffeine, findings regarding the associations between caffeine consumption, perceived cognitive function, and academic performance remain mixed.

Although certain studies reported 5 to 10% improvements in cognitive tasks such as attention and reaction time with moderate caffeine intake, however, in the study by Sami Khan et al. (2017), although 71.5% of students believed that caffeine enhanced their academic performance, the findings showed no significant association between caffeine consumption and actual academic outcomes such as Grade Point Average (GPA).

Given the inconsistent findings, it remains unclear whether caffeine-induced improvements in perceived cognitive function translate into better academic performance. Perceived cognitive function refers to an individual's self-reported evaluation of cognitive abilities, including attention, memory, concentration, and problem-solving, which are important for effective learning and academic performance (Rabin et al., 2023). Although many university students consume caffeine with the expectation of enhancing cognitive performance, evidence regarding the association between caffeine consumption, perceived cognitive function, and academic performance remains limited and inconsistent. Therefore, this study aims to determine the association between caffeine consumption, perceived cognitive function, and academic performance among undergraduate university students. The findings may contribute to a better understanding of whether perceived cognitive benefits associated with caffeine consumption are related to academic performance and support the promotion of informed and healthier caffeine consumption practices.

1.3 SIGNIFICANCE OF THE STUDY

This study aims to provide a clearer understanding of the association between caffeine consumption, perceived cognitive function, and academic performance among university students at the Health Campus of Universiti Sains Malaysia (USM). By examining the potential effects of caffeine on concentration, focus, memory, study habits, and overall academic performance, this research may help students make smarter choices about their caffeine intake while maintaining their well-being. Understanding how caffeine influences cognitive function, such as attention, memory, and processing speed, is particularly important in evaluating its role as a supportive or potentially disruptive factor in learning.

Many students rely on caffeinated drinks to stay awake during late-night study sessions, believing it helps them remain alert and focused. However, not all students are aware that excessive caffeine intake can affect concentration, sleep quality, anxiety, and cognitive performance. By studying the relationship between caffeine use, perceived cognitive function, and academic outcomes, the findings can help students reflect on their habits and determine whether their caffeine consumption is truly supporting their learning or creating hidden challenges.

Currently, there is limited research in Malaysia, particularly at USM, on whether caffeine-induced improvements in perceived cognitive function actually translate into better academic performance. Previous studies, mostly from international contexts, have produced inconsistent and sometimes inconclusive results. Understanding this relationship is important because cognitive abilities such as attention, memory, and processing speed directly influence learning outcomes. By examining the association between caffeine consumption, perceived cognitive function, and academic performance among university students, this study aims to provide evidence on whether changes in

perceived cognitive function related to caffeine use affect academic achievement. The findings can help guide students toward healthier caffeine consumption practices and increase awareness of its potential effects on both perceptions towards cognitive function and academic performance.

1.4 CONCEPTUAL FRAMEWORK

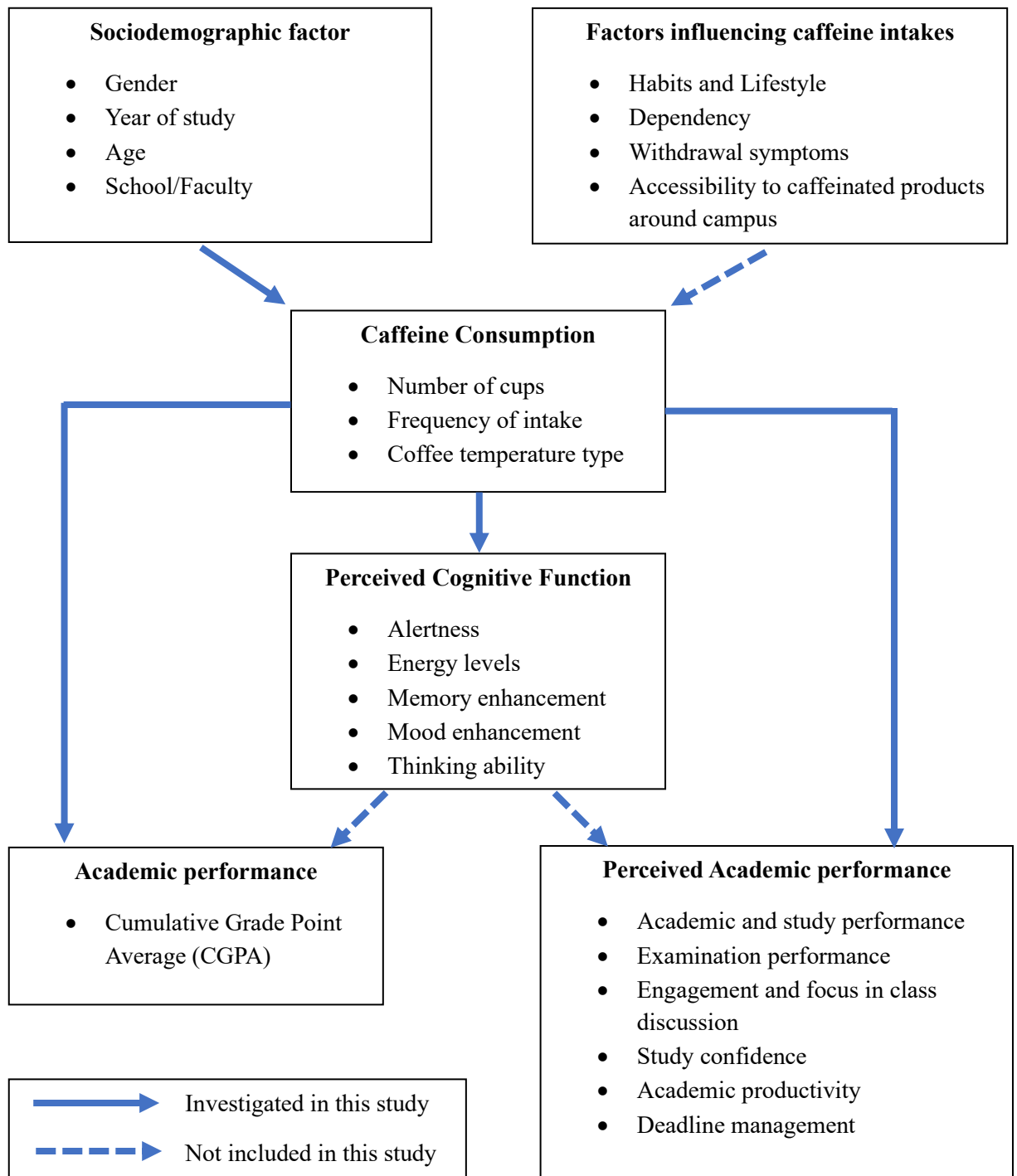


Figure 1.1: Conceptual Framework of the association between caffeine consumption, perceived cognitive function and academic performance among the university students of PPSK, PPSG and PPSP in USM

The conceptual framework of this study illustrates the proposed relationship between caffeine consumption, perceived cognitive function, and academic performance among university students at Universiti Sains Malaysia (USM) Health Campus. The framework was developed based on previous studies that suggested caffeine consumption may influence perceived cognitive function and academic performance. It also includes several factors that may influence student's caffeine consumption behaviour.

In this framework, sociodemographic factors, including gender, year of study, age, and school or faculty, are considered to influence caffeine consumption among university students. For example, students who often have to deal with heavy academic workloads and late-night study sessions may make them more likely to rely on coffee or energy drinks compared to those students who don't deal with heavy academic workloads.

In addition, factors influencing caffeine intake, such as habits and lifestyle, dependency, withdrawal symptoms, and accessibility to caffeinated products around campus, are also included in the framework. However, these factors are presented to provide background information and are not directly investigated in this study.

Caffeine consumption is the independent variable in this study. It is measured based on the number of cups consumed, frequency of intake, and coffee temperature preference. Besides that, this framework proposes that caffeine consumption is associated with perceived cognitive function, which is measured using several domains such as alertness, energy levels, memory enhancement, mood enhancement, and thinking ability. These domains represent student's perceptions of how caffeine affects their cognitive function during academic activities.

Lastly, this framework also proposes that caffeine consumption is associated with both academic performance and perceived academic performance. Academic

performance is measured using student's Cumulative Grade Point Average (CGPA). Meanwhile, perceived academic performance refers to student's perceptions regarding the relation of caffeine intake and their academic and study performance, examination performance, engagement and focus in class discussions, study confidence, academic productivity, and ability to meet academic deadlines. Overall, this conceptual framework provides the basis for examining the associations between caffeine consumption, perceived cognitive function, and academic performance among university students at USM Health Campus.

1.5 STUDY OBJECTIVES

1.5.1 GENERAL OBJECTIVE

To determine the association between caffeine consumption, perceived cognitive function and academic performance among undergraduate university students at PPSK, PPSG and PPSP in Universiti Sains Malaysia (USM).

1.5.2 SPECIFIC OBJECTIVE:

1. To assess the frequency of caffeine consumption among undergraduate university students at PPSK, PPSG and PPSP in USM.
2. To assess the perceived cognitive function of undergraduate university students at PPSK, PPSG, and PPSP in USM.
3. To assess the student's academic performance among university students of PPSK, PPSG and PPSP in USM.
4. To determine the association between caffeine consumption, perceived cognitive function and academic performance among undergraduate university students at PPSK, PPSG, and PPSP in USM.

1.6 RESEARCH QUESTIONS

1. What is the frequency of caffeine consumption among undergraduate university students at PPSK, PPSG and PPSP in USM?
2. What is the level of perceived cognitive function among undergraduate university students at PPSK, PPSG, and PPSP, USM Health Campus?
3. What is the perceived academic performance among the undergraduate university students at PPSK, PPSG and PPSP in USM?
4. Is there any association between caffeine consumption, perceived cognitive function and academic performance among the undergraduate university students at PPSK, PPSG and PPSP in USM?

1.7 RESEARCH HYPOTHESIS

A) Null Hypothesis (Ho):

There is no significance association between caffeine consumption, perceived cognitive function and academic performance among the undergraduate students in USM, Health Campus.

B) Alternative Hypothesis (Ha):

There is a significance association between caffeine consumption, perceived cognitive function and academic performance among the undergraduate students in USM, Health Campus.

CHAPTER 2

LITERATURE REVIEW

This chapter reviews the existing literature related to caffeine consumption, perceived cognitive function, and academic performance among university students. It discusses the trends of caffeine consumption in both general population and university students, followed by the effects of caffeine consumption on general health, academic performance and perceived cognitive function. In addition, this chapter examines the associations between caffeine consumption, perceived cognitive function and academic performance based on findings from previous studies. This literature presented provides theoretical foundation for understanding the relationship among the variables investigated in this study.

2.1 TRENDS OF CAFFEINE CONSUMPTION IN GENERAL POPULATION

According to Rauf et al. (2025), caffeine remains the most widely consumed psychoactive substance globally, playing an integral role in daily life and dietary habits across all age groups. In a study conducted in the United States, daily caffeine consumption patterns suggest that the majority of caffeine intake occurs between 6:00 a.m. and 9:00 a.m., gradually decreasing throughout the day (Rauf et al., 2025). In contrast, adolescents exhibit a more even distribution of intake across morning, afternoon, and evening, indicating different behavioural motivations which are often related to academic and social demands(Rauf et al., 2025).

The key active ingredient found in most energy drinks is caffeine, with concentration typically ranging between 360-630mg/L (Acaroz et al., 2019). This amount is considerably higher compared to regular soft drinks and even some coffee beverages,

making energy drinks a potent source of stimulant intake (Acaroz et al., 2019). Caffeine is primarily found in coffee, energy drinks and chocolate (Tahir et al., 2022). They are also a naturally occurring stimulant that falls under the methylxanthine group of compounds and widely recognized as the most commonly consumed psychoactive substance in the world and can be found in a variety of plant-based sources such as coffee beans, tea leaves, cacao beans, and kola nuts (Akosua et al., 2023). In military populations (USA), around 87% reported of using caffeinated products at least once per week (Knapik et al., 2022).

The prevalence of caffeine consumption differs widely across regions and demographic groups, influenced by factors such as age and beverage preference. In the United States, adolescents tend to prefer coffee, whereas tea remains the dominant caffeinated drink in most Asian countries (Rauf et al., 2025). Additionally, Japan has shown a growing trend toward coffee consumption. Earlier findings in 2014 indicated that around 85% of individuals consumed coffee daily, while more recent surveys reported even higher figures which is the 2022 International Food Information Council study revealed that over 90% of American adults consume caffeinated beverages, and a 2023 Sleep Foundation survey showed this figure had risen to 94%, suggesting a continuous upward trend (Rauf et al., 2025). In China, caffeine intake also increased significantly, where only 5% of adults consumed caffeinated beverages between 2004 and 2018, but this number expanded 27-fold during that period (Rauf et al., 2025). Likewise, in Korea, adolescent caffeine use rose from 3.3% in 2015 to 12.2% in 2019. In North Lebanon, 97% of respondents reported caffeine consumption, mainly from Nescafé® (19.7%), chocolate (19.2%), soda (15.3%), tea (13.6%), coffee (9.8%), energy drinks (6.7%), and espresso (3.3%). Similarly, in Saudi Arabia, nearly 94% of adolescents

consumed caffeinated drinks, with Arabic coffee identified as the most preferred beverage (Rauf et al., 2025).

2.2 EFFECT OF CAFFEINE CONSUMPTION TO GENERAL HEALTH

Caffeine is primarily responsible for perceived effects, such as having the ability to promote and enhance an individual's memory, increased alertness, reduced fatigue, enhance an individual's memory, improved concentration and bodily motor coordination (Barcelos et al., 2020). However, the high caffeine content may also raise health concerns, addiction and may lead to withdrawal symptoms, dependency, and other adverse effects that may impact both physical health and academic outcomes (Bonanni et al., 2022; Faezah Jamal, 2024; Viado, 2024). This is because excessive consumption may lead to side effects like jitteriness, insomnia, anxiety, daytime sleepiness, poor academic performance, and even cardiovascular issues, therefore, the daily caffeine intake should not exceed 400 mg to avoid any of these side effects (Faezah Jamal, 2024).

Previous studies have indicated that CC patterns among university students vary widely, influenced by gender, academic pressure and social norms (Faezah Jamal, 2024). Based on another research according to Viado (2024), her study also mentioned regarding the presence of the potential risks related to coffee dependency despite the caffeine ability to enhances cognitive and academic performance. While caffeine indeed can temporarily improve cognitive performance and reduce fatigue, excessive or poorly timed intake may negatively impact sleep, mood, and overall health (Bonanni et al., 2022).

According to the study by Bonanni et al. (2022), they emphasized that caffeine delays sleep onset, shortens sleep duration, and lowers sleep quality. Poor sleep caused by caffeine leads to increased irritability, fatigue, and reduced cognitive performance,

which may eventually affect both physical and mental health. In addition, overconsumption of caffeine can increase heart rate and blood pressure, contributing to symptoms such as restlessness, anxiety, and nervousness, especially in sensitive individuals. Although caffeine provides short-term benefits like increased alertness, prolonged or excessive intake can negatively impact overall well-being. Dependence may also occur, where individuals experience headaches and tiredness when reducing their caffeine intake (Bonanni et al., 2022; Viado, 2024).

2.3 CAFFEINE CONSUMPTION AMONG UNIVERSITY STUDENTS

Caffeine consumption (CC) among students has been widely studied across various countries, showing that caffeinated beverages form a major part of student's daily routines and academic lifestyles (Viado, 2024). In the United States, a study by Bonanni et al. (2022), reported that energy drinks have recently become one of the most popular categories of caffeinated beverages among college students. Each type of caffeinated drink contains different caffeine concentrations; for example, coffee contains around 85 mg of caffeine per cup, meanwhile tea contains 30 mg per cup, cola contains 18 mg per cup, and energy drinks contain 80 mg per cup (Bonanni et al., 2022). The others major sources of caffeine consumed by college students are also tea (black and green), chocolate, carbonated soft drinks, energy drinks, cocoa, and medications or dietary supplements (Bonanni et al., 2022).

Similarly, a study from the Philippines by Viado (2024) state that her results indicate the fact that coffee consumptions is a prevalent part of student's daily routine especially university students, with 76.44% of them drinking coffee daily. The widespread availability of coffee around campuses through cafeterias, vending machines, and nearby

cafés contributes to frequent intake throughout the day. Coffee has become deeply associated with student's study habits, particularly for staying awake during late-night study sessions, completing assignments, or preparing for examinations (Viado, 2024).

Comparable findings were also reported in Iraq, where Alqawasmi et al. (2024) examined caffeine use among students of the University of Kirkuk, College of Medicine. Their study revealed that 53.6% of students consumed caffeine daily, 41.8% occasionally, and only 4.6% reported not consuming it at all, indicating that caffeine use is nearly universal among medical students. Furthermore, Rauf et al. (2025) highlighted a study from Massachusetts showing that age and academic level significantly influence caffeine consumption. The finding showed that as student progress through their academic years, their caffeine consumption increases, likely due to heavier academic workloads and longer study hours. Senior students were reported to consume an average of 1,698.02 mg of caffeine per week, whereas freshmen consumed about 1,106.23 mg weekly which is approximately equivalent to six to seven cups of brewed coffee per day.

In the Malaysian context, similar trends are observed, Faezah Jamal (2024) reported that coffee is the most common caffeine source among UiTM undergraduate students, with 60.5% of students preferring it over other beverages.

2.4 PERCEIVED COGNITIVE FUNCTION AMONG UNIVERSITY STUDENTS

Cognitive function refers to a person's ability to acquire knowledge and process thoughts and they conclude memory, attention, judgement and evaluation, problem solving and decision making, comprehension and production of language (Zhang & Wang, 2020). Cognitive function is influenced by various psychological, physiological, and environmental factors. Psychological factors such as motivation, emotional state,

mental fatigue, and stress levels may affect an individual's ability to concentrate and process information (Rajeswari et al., 2025). Physiological factors, including hunger, sleep quality, general health status, and post-meal drowsiness, also play a significant role in determining cognitive performance (Rajeswari et al., 2025).

Among these factors, caffeine consumption has been widely studied due to its potential effects on cognitive function as according to the study of Sadik et al. (2025), caffeine can have both beneficial and detrimental effects on cognitive function. On one hand, low to moderate doses of caffeine have been shown to enhance short-term attention, memory, and processing speed by influencing brain activity and energy regulation (Sadik et al., 2025). However, on the other hand, disruptions in biological rhythms caused by caffeine particularly with excessive intake may lead to reduced sleep quality, physical and cognitive performance (Faezah Jamal, 2024; Viado, 2024; Wikoff et al., 2017). In younger individuals, overconsumption of caffeine has been associated with sleep disturbances and potential developmental concerns (Faezah Jamal, 2024). Therefore, while caffeine may provide short-term cognitive benefits, caution is advised regarding its consumption among young populations, as long-term overuse may impair cognitive performance by negatively affecting sleep quality (Bonanni et al., 2022). Perceived cognitive function (PCF) refers to an individual's self-evaluation of their cognitive abilities, including attention, memory, alertness, concentration, mental processing, and thinking skills during daily or academic activities (Rabin et al., 2023). Unlike objective cognitive function, which is measured using standardized neuropsychological tests, perceived cognitive function reflects how individuals believe they perform cognitively (Rabin et al., 2023). PCF is particularly important among university students because academic success depends on several cognitive abilities, such as maintaining attention during lectures, processing information efficiently, remembering learning materials, and solving problems

(Valdebenito-Villalobos et al., 2022). University students often experience academic pressure, long study hours, inadequate sleep, and stress, all of which may influence how they perceive their cognitive function (Valdebenito-Villalobos et al., 2022). A positive perception of cognitive function may increase student's confidence and learning motivation, whereas poor perceived cognitive function may reduce academic engagement and performance (Valdebenito-Villalobos et al., 2022). Several factors have been reported to influence perceived cognitive function among university students and sleep quality is one of the strongest contributors, as insufficient sleep has been associated with poorer concentration, memory, and attention (Faezah Jamal & Idham Abu Hasan, 2025). In addition, lifestyle behaviours such as physical activity, dietary habits, caffeine consumption, and screen time have been suggested to influence perceived cognitive function (Faezah Jamal & Idham Abu Hasan, 2025). Among these factors, caffeine is commonly consumed by university students because it is believed to improve alertness, concentration, and mental performance during studying (Viado, 2024).

2.5 ACADEMIC PERFORMANCE AMONG UNIVERSITY STUDENTS

Academic performance is the results of student's school achievements and is influenced by factors such as family, peer group, economic possibilities, teachers, classmates, motivation, and interest in the subject activities (Carroza-Pacheco et al., 2025). Academic performance usually most widely used indicator and vital for assessing and determining student's success and achievement in their learning outcomes and meet institutional expectations (Al Husaini & Syufiza, 2022). According to Alia Izzati et al. (2021), several factors influence student's academic performance, including self-confidence, emotional well-being, concentration ability, study duration, and mental health. Students who experience low self-worth, difficulty concentrating, and feelings of

exhaustion tend to achieve lower GPAs. Students who spend more time studying generally demonstrate better academic performance (Alia Izzati et al., 2021). Academic achievement and performance refer to student's success in gaining knowledge and understanding in various subjects, as well as the ability to apply that knowledge effectively (Aljaffer et al., 2024). It is a measure of the student's progress throughout their educational journey, encompassing both academic achievements and personal growth (Aljaffer et al., 2024).

However, many researchers argue that academic performance should not be assessed solely based on grades, as based on many research articles, it is commonly measured through exam results, Grade Point Average (GPA), or coursework grades, but sometimes it also relates to things such as study habits, focus during lectures, engagement in classroom discussions, rate of class attendance, and time management (Al Husaini & Syufiza, 2022). Caffeine is known to have the ability to enhance memory, alertness, reaction time, and motor coordination (Akosua et al., 2023; Alqawasmi et al., 2024; Bonanni et al., 2022; Viado, 2024). Due to these effects, caffeine has become a staple for many college students who face demanding academic schedules and often relies on it to boost cognitive performance, sustained wakefulness, and manage academic stress (Viado, 2024).

Alqawasmi et al. (2024) highlighted that their study revealed a high prevalence of CC use among medical students, primarily influenced by academic pressures and the need to remain alert. The considerable proportion of both daily and occasional users indicates that caffeine has become embedded in student's daily routines, which serve as a potential coping mechanism to manage academic demands and workloads and fatigue. For students, maintaining good academic performance can be pretty challenging, especially with packed schedules and high expectations. Majority of the students around 73.4%

perceived caffeine as enhancing their concentration and academic performance and found that around 65.6% of students believe caffeine use can boost academic performance (Faezah Jamal, 2024). Meanwhile, according to Sami Khan et al. (2017) research, they mentioned that in Turkey, 32.6% of medical students reported energy drink consumption at least once, while in Aga Khan University, Pakistan reported that 52% medical students mostly consumed caffeine to cope up with academic and athletic stress.

According to Bonanni et al. (2022) studies, it consistently shows that CC among college students and university students is linked to poor sleep quality, including insomnia, restlessness, frequent awakenings, and difficulty falling or staying asleep if consumes in excessive amount. Caffeine delays sleep onset and disrupts circadian rhythms by blocking adenosine receptors, leading to reduced sleep efficiency (Bonanni et al., 2022). These disruption results in excessive daytime sleepiness, fatigue, and impaired alertness during lectures, which will negatively affect academic performance and also affect the student ability to learn (Bonanni et al., 2022). Excessive caffeine consumption can lead to anxiety, disrupted sleep and reduced cognitive function which potentially can affect academic performance (Bonanni et al., 2022; Petkar & Dabhade, 2026).

2.6 ASSOCIATION BETWEEN CAFFEINE CONSUMPTION, PERCEIVED COGNITIVE FUNCTION AND ACADEMIC PERFORMANCE

A study conducted by Sami Khan et al. (2017) at Dow University of Health Sciences (DUHS) located in Karachi, Pakistan, explored both student's perceptions and the actual association between CC and AP. The findings revealed that a large proportion of students perceived caffeine to be beneficial for their studies: 71.5% reported that it

helps in increases overall academic performance, 22% believed it increases Intelligence Quotient (IQ) and approximately half indicated that it facilitated overnight studying. Moreover, 71% of students felt that caffeine boosted their self-confidence, 36.7% believed it improved their reading ability, 45% reported that it extended their study hours, 70% suggested it alleviated fatigue, and 75% indicated that it enhanced group activity. However, in their study, Sami Khan et al. (2017) mentioned that they use indicator of GPA to assess the academic performance. Indeed, 71.5% of students believed the fact that caffeine improved academic performance, but the outcome of the study association between caffeine consumption and the GPA shows no significance at all.

However, according to Viado (2024), coffee is an integral part of student's study habits which contribute significantly to their cognitive functions and AP, especially in terms of energy, productivity and mood enhancement. Overall indicating that students generally perceived CC to have a positive effect on their cognitive enhancement and AP most of the time. On the other hand, Viado (2024) also found that while many students reported benefits such as more energy and better mood, some also experienced dependency and negative withdrawal effects when they didn't consume coffee. Bertasi et al. (2021) similarly pointed out that higher intake of caffeine has always been linked to higher anxiety levels when consuming at least one cup of coffee per day, which in turn may reduce academic performance instead of helping it.

On the other hand, according to international research, 51% of university students in the US consumed at least one energy drink in the preceding month and they use self-reported cumulative Grade Point Average (GPA) to measure academic performance for the examination of the relationship between energy drink consumption and academic performance. However, the outcome of this survey showed the fact that energy drink consumption and academic performance were negatively correlated. While a number of

studies have tried to explore the link between CC and AP, the findings still remain inconsistent and results are mixed, with most findings indicating little to no direct impact on performance outcomes (Bonanni et al., 2022). Some research points to slight improvements in areas such as alertness, concentration, and short-term memory, while others report little or no significant effect on overall academic outcomes (Bonanni et al., 2022; Dahlawi et al., 2024; Faezah Jamal & Idham Abu Hasan, 2024). This inconsistency suggests that the influence of caffeine may not be straightforward and could depend on other factors such as the amount consumed, and also an individual tolerance. For example, a moderate dose of caffeine might help a student to stay awake and focused during late at night studying, but the same consumption or higher amount of consumption may lead to restlessness, poor sleep quality, or anxiety, all of which may eventually hinder AP.

Lastly, based on Faezah Jamal (2024) studies, caffeine has long been recognized for its stimulating effects, particularly in relation to mood and fatigue reduction. A large proportion of students reports positive experiences after caffeine intake, with 88.3% indicating that caffeine temporarily elevates mood and reduces tiredness, enabling them to feel more energetic and focused during their study sessions. Similarly, other studies also have confirmed that CC can enhance alertness and provide students with the stamina that they required to sustain prolonged periods of study (Faezah Jamal, 2024). In addition, Faezah Jamal (2024) empirical findings also show that students strongly associate caffeine uses with improved study habits. For instance, nearly 80% of students in one study believed that caffeine helped them study at night, while 79.2% agreed that it prolonged their study hours.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 STUDY DESIGN

The study employed a cross-sectional study design. This type of study design was suitable for studying the association between caffeine consumption, perceived cognitive function and academic performance among university students at USM. This design allowed for the collection of data at a single point of time to assess the associations between variables.

3.2 STUDY LOCATION

This study was conducted among the university students from the School of Medical Sciences (PPSP), School of Dental Sciences (PPSG), and School of Health Sciences (PPSK) at Universiti Sains Malaysia (USM), Health Campus, Kubang Kerian, Kelantan. This location was chosen because USM consists of students from various health-related fields, background and ethnicities.

3.3 TARGET POPULATION

This study focused on university students from the School of Medical Sciences (PPSP), School of Dental Sciences (PPSG), and School of Health Sciences (PPSK) at Universiti Sains Malaysia (USM), Health Campus, Kubang Kerian, Kelantan, who were aged between 18 and 25 years old. The participants included were students from Year 1 until Year 3, Those who were unavailable or absent from the campus due to internships or clinical postings were excluded from the study.

3.4 SELECTION CRITERIA

3.4.1 INCLUSION CRITERIA

- a) Undergraduate students of Medical School, Dental School, and Health Science in USM, Health Campus, Kubang Kerian, Kelantan.
- b) Age range between 18 to 25 years old.
- c) Include students from Year 1 to Year 3.

3.4.2 EXCLUSION CRITERIA

- a) Postgraduate students or non-USM students.
- b) Individuals with medical conditions that affect caffeine metabolism such as liver disease, pregnant mother and genetic variations of CYP1A2 gene.
- c) Students who are currently on medication like ciprofloxacin, fluvoxamine, or oral contraceptives or treatment such as certain antihistamines or sleep medications that affects cognition or alertness.
- d) Students who are not present at campus due to internship or clinical posting.