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Effects of Caffeine and Anxiety Level on Psychomotor Performance

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Abstract

The study investigated the effects of caffeine and anxiety level on psychomotor performance. Sixty-eight (68) volunteer male and female students who were randomly selected from different academic faculties at the University of Lagos participated in this study. Their ages ranged from 18 to 32 years, with body weights between 55 and 65 kg. Pre-test, post-test control group experimental design was used in this research. The independent variables are caffeine and anxiety level of the participants. While the dependent variable is the psychomotor performance of the participants. Parametric statistical tests, including analysis of covariance test, t-dependent test and t-independent test were used for the data analyses. The results showed that low anxiety level group performed better on psychomotor task after taking caffeine content: ($p<.05$, df=33, ct=5.32, st=1.7); high anxiety level group did not perform poorly on psychomotor task after the administration of caffeine:($p>0.05$, df=33, ct=1.51, st=1.7); males in high anxiety level group performed better than females in high anxiety level group on psychomotor task after taking caffeine: ($p<0.05$, df=33, ct=2.55, st=1.7); females with low anxiety level did not perform better than males with low anxiety level

on psychomotor task after the administration of caffeine: ($p>0.05$, df=33, ct=0.17, st=1.7) and lastly, high anxiety level group performed better than the low anxiety level group before and after taking caffeine: ($p<0.05$, df=66, ct=2.13, st=1.67) It was generally found that caffeine affects different people in different ways with regards to their anxiety levels. The findings were discussed in terms of their potentials in enhancing our knowledge of issues concerning the use of caffeine by people of different levels of anxiety in pursuit of psychomotor tasks.

Key Words: caffeine, anxiety level, psychomotor performance, effects

Introduction

The effect of caffeine and anxiety level on performance is a complex and important problem for psychological analysis. Caffeine is a drug which is deliberately taken to change the functions of the body or mind. Caffeine was one of the principal drugs which affected the mind and its effects are equally widely recognized in the behavioural performance of human beings, most especially in psychomotor ability. The study of coffee, a content of caffeine, anxiety levels and the problems it presents is an attractive life experience. Coffee is a well-loved drink. Several characteristics of coffee make it good to man. It is habitually drunk not only in the early morning but as refreshment with all meals, and possibly between them, make its study more interesting. This study focused on the effects of combination of two independent variables; that is, caffeine (coffee) and level of anxiety on psychomotor performance. Basically, the study explored the relationships between caffeine and psychomotor performance under different levels of anxiety and attempted to find out whether there is difference in performance among males and females in different anxiety level groups after taking caffeine.

Statement of the Problem

Many people, especially in schools, industries and organisational settings, are fond of drinking coffee or tea which contained caffeine, with the hope to stimulate them, and to improve their performance. The consumption of coffee in most cases is normally done without considering the user's level of anxiety. This study therefore investigated whether caffeine could be of help to people of different levels of anxiety in different doses, in order to improve their performance. Many studies have been carried out on the effects of drugs on behavioural performance most especially the effects of stimulant drugs like caffeine on one hand; likewise, the study of the effects of anxiety level on performance has also been carried out on the other hand. There is dearth of studies to our knowledge that had considered the combination of these two variables (caffeine and anxiety level) and their joint effects on psychomotor performance, which is the concern of this study.

Objectives of the Study

Our main objective in this study was to investigate the effects of caffeine and levels of anxiety of males and females on their ability to perform or carry out psychomotor tasks. Furthermore, in line with the statement of the problem, this study focused on the following specific objectives:

1. To find if there is relationship between caffeine, low anxiety level group and psychomotor performance
2. To find if there is relationship between caffeine, high anxiety level group and psychomotor performance
3. To find if there is relationship between caffeine, gender, high anxiety level group and psychomotor performance
4. To find if there is relationship between caffeine, gender, low anxiety level group and psychomotor performance
5. To find if there is relationship between caffeine, anxiety level groups and psychomotor ability

Significance of the Study

The findings in this study will be very helpful in our society, most especially to those people that are engaging in psychomotor activities and needed to be stimulated for better performance both at work and other human endeavor. The findings will enable them to know to what extent caffeine could act in stimulating people of different anxiety level groups, in order to improve their performance. The answers to questions whether caffeine would have different effects on males and females of the two anxiety level groups as addressed in this study would be an eye opener to the consumers of caffeine.

Literature Review

Caffeine is a central nervous system stimulant of the methylxanthine class. It is the world's most widely consumed psychoactive drug. Unlike many other psychoactive substances, it is legal and unregulated in nearly all parts of the world (Nehlig, Daval & Debry, 1992). Caffeine was one of the principal drugs which affected the mind and its effect is equally widely recognised in the behavioural performance of human beings, most especially in psychomotor ability. Caffeine compound is given the chemical designation by Richter (1934) as 1, 3, 7 - try methylxanthine, with the formula $C_8H_{10}N_4O_2$. Caffeine is a stimulant contained in several drinks such as cocoa, coffee and tea. Caffeine is usually administered orally or intravenously in the form of its soluble salts. According to Bolton and Null (1981), absorption of caffeine is rapid and appreciable blood levels persist for six to twelve hours.

The amount of caffeine in different parts of the coffee tree has been determined by a number of chemists, to give an idea of the relative distribution of the alkaloid. It was reported by Fredrick (1961) that caffae arabica beans largely had 1.5 percent, flowers of a 20-year-old tree contained 0.9 percent, air dried coffee leaves had 0.82 percent and coffee stems had 0.087 percent. The cherry pulp was reported to have 0.88 percent. In caffae robusta, it had a range from 0.496 to 0.9, with highest percentage in December and January. Caffae liberica had 1.4 to 1.6 percent; caffae canephora had 1.5 to 2.5 percent. A cup of coffee is said to contain about 150mg caffeine (Goodman & Gilman, 1965). Caffeine consumption in older adults increases reaction time and enhances cognitive performance (Rees, Allen & Lader, 1999), and a study of women over the age of 80 suggested that higher lifetime coffee consumption was associated with better performance in several cognitive tests (Johnson-Kozlow, Kritz-Silverstein, Barrett-Connor & Morton, 2002). It is difficult to discern if this difference is due to coffee intake or other factors as the same distinction was not observed in them. On the other hand, a long-term longitudinal study examining the positive effect of extended caffeine intake and cognitive performance found potential benefit of caffeine limited, leading to the suggestion that caffeine does not produce any reduction in potential age-related cognitive decline (Van Boxtel, Schmitt, Bosma & Holles, 2003)

Similarly, anxiety as defined by a Psychoanalyst is a diffused feeling of dread, apprehension, impending catastrophe, experienced when one is threatened by unknown danger from outside or by unconscious forces, conflicts or impulses within oneself (Eysenck, 1973). In experimental situation, anxiety is defined by a response or class reactions by individuals to a particular stimulus or experimental situation. For example, the experimenter may ask each participant the standard question “are you afraid?” The question and response “yes” constitute a definition of anxiety. Similarly, the experimenter threatens to shock the participant with electricity, the participant begins to sweat and his or her pulse rate increases. The threat of shock, the sweating and the increased pulse rate together constitute another definition of anxiety. These definitions are regarded as the operational definition of anxiety (Eugene, 1967).

Anxiety can be measured physiologically or psychologically in experimental settings. In this study, only psychological measures were used. Psychological measures of anxiety in an experimental setting can be carried out using either projective techniques or by the use of inventory. Inventory, which was the psychological measure used in this study is by far the most popular device for the measurement of anxiety in experimental situations. An inventory consists of items, statement of words that are descriptive of the way which an individual may feel or think about himself or herself or their immediate environment (Eugene, 1967). The participant responds by assigning a degree of truth or falseness, or agreement or disagreement, to items, each of which contributes one or more points to his/her total score, depending upon the arrangement for responding. The total score is considered to be a direct, quantitative account of the

individual's anxiety level. Inventory can be administered and scored quickly by almost anyone, and it presents no difficulties in group administration. Its reliability is greater than that of physiological measures, meaning that it is less affected by extraneous factors in the experimental situation.

Taylor Manifest Anxiety Inventory adopted in this study was the first anxiety inventory available for general use and was developed by Taylor (1953) and published two years later. The Manifest Anxiety Scale (MAS) is one of a number of inventories of different kinds taken from the five hundred and fifty (550) items of the Minnesota Multiphasic Personality Inventory (MMPI). The MMPI, whose purpose is to identify psychopathological tendencies, is itself the most widely used inventory of all time (Eugene, 1967). Fifty (50) items of MAS were selected originally on the basis of their ability to detect clinical anxiety. The participant's score is the number of items to which he/she has given the anxious responses, which may be either true or false depending on the item.

Other available anxiety inventories not used in this study include IPAT Anxiety Scale, S-R Inventory of Anxiousness, Affect Adjective Checklist, the Subjective Stress Scale, Freeman Manifest Anxiety Test, State-Trait Anxiety Inventory, Test Anxiety Questionnaire and Achievement Anxiety Test (Eugene, 1967).

Psychomotor performance which is the last variable and the independent variable considered in this study is one of the most important concepts of psychology. One of the major problems which have occupied workers in the field has been the puzzling question of the specificity or generality of the ability required to perform psychomotor tasks. The term psychomotor is defined as pertaining to the motor effects of mental or cerebral processes. Psychomotor tests are simply a means of measuring the speed and accuracy of central functioning. It involves movements of the parts of the body most especially the upper and the lower limbs in the attainment of a goal, coupled with the visual and intellectual (brain) functioning of the person (Anderson, 1982). However, psychomotor test is designed to assess eye-hand coordination, hand steadiness, limbs movement and coordination plus other physical activities.

There are different types of psychomotor tests that may be distinguished: those involving the measurement of general speed of responding in a given situation involving a motor response; those involving complex motor response; those involving continuous motor response where speed is not a factor. The categories are purely arbitrary and some tests included in one category could equally have been included in another. A large variety of psychomotor tasks have been used in attempts to elucidate the nature of the supposed deficit in various categories of abnormality (Eysenck, 1973). It is in fact implicitly assumed in many psychomotor studies that all participants are equal in their ability as far as the motor act itself is concerned. Commonly used psychomotor tests include Pursuit Rotor Test and Mirror Tracing Test. Pursuit rotor

test was used in this study as described under the sub-head instruments of the method of the study.

Many related studies have been carried out on the effects of drugs on behavioural performance. For instance, Jacobson, Winter-Roberts and Gemmell (1991) assessed the effects of caffeine on selected manual manipulation skills. Sixteen (16) college caffeine-naïve women (<90 mg/day), with average age of 21 years having avoided products containing caffeine for four days, reported for testing eight hours postprandial. Measurements included duration and frequency of error for hand steadiness, duration and frequency of error for following a tracing pattern, and duration of completing a tweezer-pin placement dexterity test. Caffeine doses of either 2.5 or 5.0 mg/kg body weight or a placebo (200mg. methylcellulose) were administered randomly to all subjects on three separate occasions using a double-blind format. A 2 x 3 repeated-measures analysis of variance and a Newman-Keuls Post Hoc Test yielded a significant difference in hand steadiness error from pre-test to posttest trial. For frequency of hand steadiness error, significant changes occurred for both 5.0 and 2.5mg/kg. a dose of 5.0 mg/kg group resulted in significant differences in both tracing error time and error frequency. As both doses of caffeine significantly increased dexterity time, it was concluded that caffeine has detrimental effects on selected performance skills of young caffeine-naïve women

Similarly, Baker and Theologus (1972) examined the effects of caffeine on a protracted visual monitoring task in the United States of America. One hundred male undergraduate participants monitored two red lights that moved apart at random intervals. Participants were divided into five groups of twenty each. Twenty measures of response latency were provided for each participant in the four-hour continuous testing. Groups of subject were given the following treatments: Placebo: 200mg at the 1st hour: 400mg at the 2nd hour: and 400mg at the 3rd. Results indicated that caffeine significantly inhibited response. The effect was apparent within one hour following administration and persisted over the remaining 3 hours.

In another study, Tevaski (1981) tested the hypothesis that high anxiety participants as assessed by the manifest anxiety scale would show a marked performance decrement in response to noise stress. Ten high anxious and ten low anxious participants performed 4-choice serial tasks under white noise (In a signal processing, white noise is a random signal having equal intensity at different frequencies, giving it a constant power spectral density). In low anxious participants, noise increased error response, but high anxious participants were not affected.

Anderson and Revelle (1983) studied the interactive effects of caffeine, impulsivity and task demands on a visual search task. They hypothesized that arousal hinders short term memory process but facilitates intentional processes. In a study of body temperature and performance, eighty-four undergraduates classified as low or high

impulsive were given either caffeine or placebo. Two versions of a visual search task: one with a 2-letter target (a low memory load task); and one with a 6-letter target (a high memory load task) were used. As predicted by the researchers, caffeine differentially affected the two tasks. Participants that were given caffeine detected a lower proportion of 6-letter targets but a greater proportion of 2-letter target than did participants given placebo.

Furthermore, Putz-Anderson, Setzer and Croxton (1981) studied the effects of alcohol and caffeine on man. According to them, industrial workers are frequently ingesting quantities of alcohol and caffeine both of which affect the central nervous system. They assessed the behavioural effects of these substances alone and when combined. Eighty-four participants between 18 to 32 years old were assigned to 1to 6 treatments group. They were tested on three performance tasks. Results indicated that alcohol dose sufficient to register blood levels of 0.08% produced significant impairment of 10% on all the 3 tests, which included eye-hand coordination and alertness. A caffeine dose equivalent of 2 cups of coffee (250mg) produced a small but significant impairment on only the eye-hand coordination test.

In all the studies reviewed where caffeine was used as the independent variable, the experimenter did not consider the anxiety level of the participants. Similarly, in studies where anxiety level was considered as the independent variable, caffeine was not administered to the participants. This present study considered and combined these two variables as the independent variables which resulted to the formulation of the hypotheses below.

The following hypotheses were tested in the study:

1. Low anxiety level group will perform better on psychomotor task after the administration of caffeine content
2. High anxiety level group will perform poorly on psychomotor task after the administration of caffeine content.
3. Males in high anxiety level group will perform better than females in high anxiety level group on psychomotor task after the administration of caffeine
4. Females in low anxiety level group will perform better than females in low anxiety level group on psychomotor task after the administration of caffeine
5. High anxiety level group will perform better than low anxiety level group after the administration of caffeine

Research Method

Participants

Sixty-eight (68) participants were used for the study. These comprise thirty-four male and thirty-four female students randomly selected from different academic faculties at the University of Lagos, Akoka campus. Their ages were between 18 and 32 years, with body weight between 55kg and 65kg. These participants were the students that qualified after answering the coffee drinking habit questionnaire, a statistically validated test designed by the Department of Psychology, University of Lagos. Those that were naive or novice in coffee drinking habit were selected. The participants were equally divided into two groups: high and low anxiety level groups, with the help of Taylor Manifest Anxiety Scale.

Instruments

The instruments used in this study include the coffee drinking habit questionnaire designed in the Department of Psychology, University of Lagos. This questionnaire was used to select those students that were naïve or novice in coffee drinking habit. The questionnaire consists of several questions which reflect the actual drinking habit of the person in question. It is in form of multiple choice questions. Those that classified their drinking habit under novice were selected for the experiment. Similarly, Taylor Manifest Anxiety Scale was used to classify participants into low and high anxiety groups. The Manifest Anxiety Scale is one of a number of inventories of different kinds taken from the five hundred and fifty (550) items of the Minnesota Multiphasic Personality Inventory (MMPI). Fifty (50) items of the Manifest Anxiety Scale selected originally on the basis of their ability to detect clinical anxiety. The participant's score is the number of items to which he has given the anxious response which may be either true or false depending on the item. Finally, the equipment used in the study is called a Pursuit Rotor Machine. This is an electronically operated instrument. The machine is used to demonstrate simple learning and reminiscence phenomena. The pursuit rotor target tracking test was designed to measure eye-hand coordination of the participants before and after the administration of caffeine. This instrument is designed to measure psychomotor performance.

The instrument has a turntable unit and a target or a smooth brass disc about the size of three-quarters of an inch in diameter, set flush into eleven inches bakalite disc which is about two inches from the edge. The bakalite disc which carries the target can be made to rotate at one of the following rates: one revolution per second, one revolution per 1.5 seconds, one revolution per 2.0 seconds, one revolution per 3.0 seconds and one revolution per 4.0 seconds. The participant is expected to pursue the target with a flexible stylus which could be held in contact with the disc but not pressed against it. Closely located around the target ring are two other rings; ring 1 and ring 2; and these rings run around the target ring and are 0.75 inches and 0.5 inches respectively away from the centre of the target disc or ring. Connected to the pursuit rotor turntable is a counter which records scores for the target, ring 1 and ring 2 when the stylus is on any

of them, second by second. The counters are driven by transistor amplifiers mounted beneath the turntable. The counter is housed in a separate small metal case which is plugged into the turntable unit on an extension cable. The target score stands for the main performance scores while rings 1 and 2 are error scores. Return of counter to zero is done by mechanical push button.

Other instruments used in this study include Nescafe, a pure soluble coffee, which serves as the caffeine content; a stop watch, tea cups for distributing the coffee, tea spoon, electric kettle for boiling water, paper and biro for recording the scores.

Research Design

Pre-test, post-test control two groups' experimental design was used in this study. Two independent variables: caffeine and anxiety level, were considered. The dependent variable is the psychomotor performance of the participants. Table 1 shows a diagrammatical representation of the design.

Table 1: Diagrammatical Representation of the Research Design

Design	Groups	Experimental Tasks
Pre test	2 Groups High anxiety level group Low anxiety level group	Psychomotor task
Post test	2 Groups High anxiety level group Low anxiety level group	Psychomotor task

Method of Data Analysis

The data were analysed by Analysis of Covariance (ANOCOVA) to differentiate between the performance of the two groups, t-dependent test to find the differences between the pre and post-test of each group and lastly, t-independent test to find sex differences. 0.05 level of significance was adopted and extraneous variables were controlled. Below were some of measures used in controlling extraneous variables in the study.

Measures Adopted for Controlling Extraneous Variables

The following measures were used in controlling extraneous variables that might confound the results of the experiment.

- All the participants took the caffeine content (coffee) orally to achieve equal rate of absorption and digestion.
- The researcher made sure that the participants had taken their breakfast before coming for the experiment.

- Weight of the body determines the ability of the body to distribute the caffeine content. Consequently, participants with the average body weight of 60 kg were used for the experiment, to control the variation in the distribution of caffeine content in the body.
- All the participants were tested under the same room condition. All the tests were carried out in the morning between 9.00am and 12.00noon each day.
- A fifteen (15) minute break was given to each and every participant after taking the coffee to be sure that the body has absorbed the coffee.
- In order to control for previous knowledge of the equipment, the participants were allowed to manipulate and play with the equipment before they were tested on it
- Carryover effect was controlled by given five (5) minutes interval of rest to each participants after each trial in both sections of the experiment
- Coffee drinking habit questionnaire was used to select participants that were novice of coffee drinking. Furthermore, participants who were found to be taking other stimulant drugs or other drugs that could affect their psychomotor performance were eliminated. This was done by relaying a statement to each and every participant. The statement went thus: "Please if you know that you took or are fond of taking any drug, you are advised not to take part in the experiment".

Procedure of the Study

Sixty-eight (68) students from different academic faculties at the University of Lagos, Nigeria, participated in the experiment. They emerged as participants after administering the coffee drinking habit questionnaire and were placed under two anxiety groups (high and low anxiety groups) via the administration of the Taylor Manifest Anxiety Inventory Scale on them. This comprises thirty-four participants in each of the groups. The participants were given identification numbers and the researcher had a sheet of paper where the names of the participants were written according to their identification numbers in order to avoid being missed up.

The study was carried out at the laboratory of the Department of Psychology, University of Lagos. On the day of the experiment, the participants were given the opportunity of manipulating and playing with the pursuit rotor equipment before they were tested. This was to familiarise the participants with the equipment and in order to control probable past knowledge on the part of some participants. Participants were made to feel relax and be in a good mood. The experiment was carried out under two conditions. The first condition was when the rotor speed was at three (3) seconds per revolution and the other condition was when the rotor speed was at one (1) second per

revolution. In each condition, one minute was given to each participant to perform the task of tracking down the bull's eye (target disc) with the stylus. Stop watch was used to calculate the time.

Before coffee was administered to the participants, a pretest task was performed by the participants. The participants were given an instruction pertaining to the task. The instructions read thus: "This is a pursuit rotor for target tracking test. It was designed to measure eye-hand coordination. Try to track down the bull's eye with the stylus and this will show your ability in the perceptual motor skill learning". The participants were instructed to perform the task in one minute each, under the two conditions stated above. The scores of the performance on the target ring were recorded.

After the pretest, caffeine content (coffee) was given to the participants. A cup of coffee is said to contain about 150mg caffeine (Goodman & Gilman, 1965). Two levels of teaspoon of Nescafe, a pure soluble coffee was mixed with warm water with two cubes of sugar. The preparation was equivalent to a tea cup. Coffee was administered to the participants in two phases. In the first phase, first shot of coffee (a full tea cup) was given to the participants. After fifteen minutes of the intake, the participants were told to perform the same task as before in both conditions. The same instruction as above was given to the participants. They all performed the same task. In the second phase, the participants were given the second shot of coffee. After five minutes of administration of the coffee, they were asked to perform the same task as before in one minute each, and with the same instruction as before. The mean scores of the phases were recorded as the post test scores. All the participants in the two anxiety groups performed the same task.

The data were collected by only taking note of the recordings on the target score of the pursuit rotor which indicated how frequently the participants struck the target. The higher the scores on the pursuit rotor, the better the psychomotor performance of the participants. The experiment lasted for two (2) weeks.

Results

1. Relationship between caffeine, low anxiety level group and psychomotor performance

As indicated in table 2, computed t value of 5.32 is greater than the critical t value of 1.7 with the degree of freedom of 33 under assumed level of significance of 0.05. Consequently, the first hypothesis that caffeine will have statistically significant effect on the psychomotor performance of the low anxiety level group was confirmed: $p<.05$, df=33, ct=5.32, st=1.7.

Table 2: Summary of t-dependent test analysis of effect of caffeine on psychomotor performance of the low anxiety group

Experimental Task	N	Mean	df	ct	st	p
Pretest(Psychomotor)	34	7.72	33	5.32	1.70	0.05
Posttest(Psychomotor)		9.21				

2. Relationship between caffeine, high anxiety level group and psychomotor performance

As seen in table 3, computed t value of 1.51 is less than the critical t value of 1.7 with the degree of freedom of 33 under assumed level of significance of 0.05. Consequently, the second hypothesis that stated that caffeine will have statistically significant effect on the psychomotor performance of the high anxiety level group was not confirmed: $p>0.05$, df=33, ct=1.51, st=1.7.

Table 3: Summary of t-dependent test analysis of effect of caffeine on psychomotor performance of the high anxiety group

Experimental Task	N	Mean	df	ct	st	p
Pretest(Psychomotor)	34	8.48	33	1.51	1.70	0.05
Posttest(Psychomotor)		9.01				

3. Relationship between caffeine, gender, high anxiety level group and psychomotor performance

As indicated in table 4, computed t value of 2.55 is greater than the critical t value of 1.7 with the degree of freedom of 33 under assumed level of significance of 0.05. Consequently, the third hypothesis that stated that caffeine will have statistically significant different effects on males and females in performing psychomotor task among the high anxiety level group was confirmed: $p<0.05$, df=33, ct=2.55, st=1.7.

Table 4: Summary of t-independent test analysis of effect of caffeine on psychomotor performance of sex differences among the high anxiety group

Experimental Task	N	Mean	df	ct	st	p
Males	34	1.36	33	2.55	1.70	0.05
Females		0.30				

4. Relationship between caffeine, gender, low anxiety level group and psychomotor performance

As shown in table 5, computed t value of 0.17 is less than the critical t value of 1.7 with the degree of freedom of 33 under assumed level of significance of 0.05. Consequently, the fourth hypothesis that stated that caffeine will have statistically significant different effects on males and females in performing psychomotor task among the low anxiety level group was not confirmed: p>0.05, df=33, ct=0.17, st=1.7

Table 5: Summary of t-independent test analysis of effect of caffeine on psychomotor performance of sex differences among the low anxiety group

Experimental Task	N	Mean	df	ct	st	p
Males Females	34	1.56 1.46	33	0.17	1.70	0.05

5. Relationship between caffeine, anxiety level groups and psychomotor ability

From table 6, computed t value of 2.13 is greater than the critical t value of 1.67 with the degree of freedom of 66 under assumed level of significance of 0.05. Consequently, the fifth hypothesis that stated that caffeine will have statistically significant differences between high anxiety level group and low anxiety level group in their psychomotor ability after the administration of caffeine content was confirmed: p<0.05, df=66, ct=2.13, st=1.67.

Table 6: Summary of analysis of covariance test to analyse the differences between the performances of the two anxiety level groups in their psychomotor ability after the administration of caffeine content

Experimental Task	N	Mean	df	ct	st	p
Males Females	34	0.53 1.51	66	2.13	1.67	0.05

Summary of Findings

In respect of the first hypothesis, it was found that there was statistically significant effect of caffeine on the psychomotor performance of the low anxiety level group. The hypothesis was confirmed.

For the second hypothesis, it was found that there was no statistically significant effect of caffeine on the psychomotor performance of the high anxiety level group. The hypothesis was not confirmed.

It was found in the third hypothesis that there was a statistically significant different effect of caffeine on males and females in performing psychomotor task among the high anxiety level group. The hypothesis was confirmed

It was found in the fourth hypothesis that there was no statistically significant different effect of caffeine on males and females in performing psychomotor task among the low anxiety level group. The hypothesis was not confirmed

As regards the fifth hypothesis, it was found that there was a statistically significant difference between high anxiety level group and low anxiety level group in their psychomotor ability after the administration of caffeine content. The hypothesis was confirmed.

Discussions and Conclusion

Some of the results were statistically significant in terms of their differences, while some were not. In essence, some of the results conformed to the laid down hypotheses while some of the results ran contrary to the hypotheses. Indeed, caffeine affects some individuals more than the others, but others are relatively unaffected. Going through the answers to the questions posed in this study, it is plausible to link coffee drinking with our personality model, and the arousal and motivation associated with it. A person is most likely to drink coffee when he/she has an undesirable low level of arousal. But there are some groups of people who drink mostly in situations including low level arousal in order to increase their arousal level, and there are some groups of people who drink in situations which include high level of arousal in order to reduce their arousal level. The stimulating effects of caffeine results in increased capacity for both mental and muscular work of some groups of people and to some extent decrease the capacity of others. Anxiety is however not totally negative. It motivates and promotes efficient performance of tasks which are simple and very well planned. Moderate anxiety enhances human striving because much endless doing that we call progress is one way or another, a consequence of anxiety.

Some limitations that might restrict the generalisabilty of the findings may be attributed firstly to the doses of caffeine (coffee) administered in the course of the experiment, which may be subjective in yielding different results in psychomotor tasks and performance; and secondly, is the possible faking responses which the participants might have adopted in the course of responding to the coffee habit drinking questionnaire and the anxiety scale. The participants might decide to give wrong information about themselves in order to impress the researcher and to be eligible for the experiment. Future researchers in this area should endeavour to take precaution and address the aforementioned limitations.

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