

5-2016

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Recommended Citation

Bindbeutel, Mary (2016) "Correlation between a Students' Academic Performance and Caffeine Intake," *Undergraduate Psychology Research Methods Journal*: Vol. 1 : Iss. 18 , Article 6.

Available at: https://digitalcommons.lindenwood.edu/psych_journals/vol1/iss18/6

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Correlation between a Students' Academic Performance and Caffeine Intake

Mary Bindbeutel⁵

On most college campuses around the country, one would find it difficult not to run into a coffee cart or a vending machine chock-full of caffeinated beverages. The purpose of this study was to determine whether or not there is a correlation between a student's academic performance and their daily intake of caffeine. I hypothesized that there would be a negative correlation between these variables. That is, I predicted those who reported low levels of caffeine intake would have higher levels of academic performance. This study consisted of 17 participants who were surveyed over their daily caffeine intake and their academic performance. Once analyzed, the results revealed no support for my hypothesis. Participants who reported high levels of academic performance also reported moderate to high levels of caffeine intake. The positive correlation from the results could be due to students' tolerance for caffeine. After so many years of drinking the substance on a day to day basis, many could see less of the effects that caffeine has on them.

It is estimated that 90% of adults in North America consume some form of caffeine in their daily lives, therefore, causing caffeine to become one of the most widely used psychoactive substances (Olsen, 2013). While taking a stroll through a college campus, one is likely to see a multitude of students sipping on some form of caffeinated beverage. Many students use this substance as a quick energy boost to help them with their academic endeavors. However, does caffeine improve academic performance enough to compensate for all of the negative side effects?

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In 2007, a study was conducted by Malinauskas, Abey, Overton, Carpenter-Abey, and Barber-Heidal (2007), researching what percentages of college students consume caffeine and for what reasons. Among the 253 participants, it was found that 67% used caffeine to manage insufficient sleep and 65% used caffeine for energy boosts. Nevertheless, 29% of students reported weekly crash episodes, 22% experienced headaches, and 19% suffered from heart palpitations (Malinauskas et al., 2007).

In a study done by Blakeslee (1991), caffeine, in large doses, has been shown to produce sleeping and panic disorders. Caffeine is nearly identical to Adenosine, a compound that is used by the brain to produce and regulate energy. When a person consumes caffeine, the caffeine molecules block the passageways for the adenosine (Blakeslee, 1991). The person remains on a caffeine “high” for a few hours and then begins to come down. In the meantime, the body supplements for the lack of adenosine by producing more. This is what causes regular users sleep patterns to fluctuate.

Similarly, Petit and Debar (2011), discuss additional side effects that come with regular caffeine consumption. These effects can range anywhere from elevated blood sugar and glucose levels to dehydration and complete dependency in college students. In more severe cases, some have experienced, “tachycardia, myocardial infarction, seizure, coma, and renal and musculoskeletal” issues (Petit & Debar, 2011, p. 335).

In the course of their study, Petit and Debar (2011) found that as stress increases, college students gravitate towards caffeine to help them with their studies. More notably, they showed that upperclassmen (i.e., juniors and seniors) showed more caffeine consumption than the underclassmen (i.e., freshman and sophomores). Because of the additional stress upperclassmen face, they become more susceptible to gravitating toward caffeine for help with their academics.

Mitchell and Redman (1992), conducted a study where they distributed caffeine capsules (196mg to 388mg) to participants, then tested them on various cognitive tasks, one of those being a short term memory task. Here, they found that there was no significant difference in performance between those given the low dose and those given the high dose of caffeine.

Similar to this, Paulus, Roth, Titus, Chen, Bridges and Woodwayard (2015), conducted a study where they divided college students into either a placebo (flour) or one of the three caffeine treatment groups (5-hour Energy Shot, Starbucks Double Shot, or caffeine powder), then tested them five hours later over their cognitive function and their current mood. They then completed a series of Stroop and memory tests to determine their cognitive skills. All treatment groups saw an increase in cognitive skills and had quicker times on the Stroop Tests. The 5-hour Energy Shot group, however, had the best times out of any of the others (Paulus et al., 2015).

The purpose of the present study was to examine the correlation between college students' academic performance and their regular caffeine intake. While the studies above have

looked at the correlation between caffeine and cognitive skills, none have examined the relationship between caffeine and academics. Through the use of an online survey, participants were asked a series of questions that delved into their academics and the amount of caffeine they consumed. The hypothesis was that students who reported high consumptions of caffeine would have lower academic success than those who occasionally or never consume caffeine.

Method

Participants

Participants consisted of 19 graduate and undergraduate students from various universities. There were 12 women and 5 men whose ages ranged from 19-53. The mean age of participants was 26. Of the 17 participants, 2 reported they were sophomores, 4 reported they were junior, 3 reported they were seniors, and 8 reported they were in graduate school. This study originally had 30 participants, however, only 17 could actually be used because the other 13 reported they were not college students; therefore, they were disqualified from taking part.

The participants were recruited through the Lindenwood Participant Pool (LPP), a site for researchers to gain participants and also give students in entry level courses a way to earn bonus points, and also through Facebook. The survey was posted on Sona Systems, a site where Lindenwood students can sign-up for ongoing studies, allotting any students who are a part of the LPP have the ability to click on the link and take the survey. On Facebook, a non-coercive

message was posted explaining the study with the link to the survey. Students who took the survey through the LPP were awarded extra credit by either their Psychology, Sociology, Anthropology, Athletic Training, or Exercise Science professors. Other than this, no incentives were awarded for participation in this study.

Materials and Procedure

Materials used in this study were a computer and an online survey that was created on SurveyGizmo, an online survey platform (see Appendix A). Since participants were able to take the survey wherever they liked, location for this study was dependent upon each individual participant.

Participants began by clicking on either the link on the Lindenwood Participant Pool or Facebook. After this, they were directed to SurveyGizmo. Here, they read through the informed consent and clicked on either, "I am at least 18 years old and wish to participate" or "I am not 18 years old or do not wish to participate" (see Appendix A). If they chose that they were not 18 or did not wish to participate, they were immediately directed to the thank you letter.

Once participants gave their consent, they answered three short questions about their demographic information. Next, they answered 20 questions pertaining to the type and amount of caffeine they regularly consumed and their academic performance. Some of the questions included were: whether the participants achieved mostly As, Bs, Cs, Ds, or Fs in their classes,

how hard they feel they work for their grades, whether or not they drank caffeine, how much caffeine they drank daily, and whether or not they felt they needed caffeine to get them through their classes. Of the 19 participants, 18 answered “Yes” to the question of whether they drank caffeine or not and only 1 answered “No.”

This survey took approximately 10-15 min to complete. Finally, once participants finished the survey, they were able to read through the thank you page and feedback letter (see Appendix A). This outlined the hypothesis of the study and also provided each participant with the principal investigator’s contact information in case they had any further questions. Finally, SPSS, a program where one is able to complete statistical analyses of collected data, was used to compute a Spearman’s r to determine whether or not there was a negative correlation between the two variables.

Results

The hypothesis, students who have a lower daily caffeine intake would have higher academic performance, was not supported. The results of a Spearman’s r , which is used to assess relationships between ranked and ratio measures revealed that the relationship between caffeine intake and academic performance was not statistically significant, $p = .188$. The analysis showed that, while small, students who have a higher level of daily caffeine intake report higher levels of academic performance, which is directly contrary to my hypothesis.

Discussion

The hypothesis to this study stated that students who have a lower daily caffeine intake would have higher academic performance. However, once the data were analyzed, the hypothesis was not in support of my hypothesis, in that, students with high daily caffeine intake also had high academic performance. Thus, showing a positive correlation between the two variables or $p = .188$.

While a positive correlation existed, it was not significant enough to tell whether there is a relationship between caffeine and academic performance. A more in depth study should be done to tell whether caffeine truly impacts academic performance or not. A possible study would be one where participants are administered caffeinated beverages, each with differing levels of caffeine, and then are given a test focusing over various subjects related to school; very similar to study done by Mitchell and Redman (1992) and their administration of caffeine pills. A researcher could analyze the data and see whether or not caffeine, and its amount, had an impact on participant's performance.

Another suggestion for further research would be advertise participation for the study on college campuses rather than using Facebook. While it is not certain whether this can be attributed to the use of Facebook, advertising on a college campus would better ensure participants would be college students.

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Appendix A

Correlation between Academic Performance and Caffeine Intake

Informed Consent Statement

This survey is about the possible correlation between academic performance and a student's caffeine intake. Mary Bindbeutel created this survey as part of a research project for the Lindenwood University psychology department. This survey contains questions measuring ones academic performance and the amount of caffeine they regularly consume.

This survey will take approximately 10 to 15 minutes to complete. Although your participation may not result in direct benefits to you, information from this study may help provide insight into the overuse of caffeine in one's daily life. There are no correct answers to these questions. Answer the questions to the best of ones' ability; do not over analyze any of these questions. Please read the information below before deciding whether or not to participate.

Your responses will be anonymous. No information that identifies you personally will be collected. The principal investigator will not be able to identify your answers as belonging to you. The data collected is looking at the cumulative results of academic performance compared to caffeine consumption, rather than individual.

Your participation is completely voluntary. You may discontinue taking the survey at any time. If you choose not to participate or stop participating before the end of the survey, you will not be penalized in any way. You are allowed to skip any question that you do not feel comfortable answering. The results of this survey will be used for scholarly purposes only. If you have any questions about the survey itself, please contact the principal investigator, Mary Bindbeutel, at (636)-515-7792 or meb490@lionmail.lindenwood.edu. You may also ask questions of or state concerns regarding your participation to the Lindenwood Institutional Review Board (IRB) through contacting Dr. Marilyn Abbott, Interim Provost at mabbott@lindenwood.edu or 636-949-4912.

*1) ELECTRONIC CONSENT: If you do not wish to participate in this study, or are not 18 years of age, please select the "I am not 18 years old or do not wish to participate" option below.**

- I am at least 18 years old and wish to participate
 - I am not 18 years old or do not wish to participate
-
-

*2) I am currently some form of college student (graduate, undergraduate, or other).**

- Yes
 - No
-

3) I am a:

- Male
- Female

4) What is your class level?

- Freshman
- Sophomore
- Junior
- Senior
- Graduate School

5) What is your age?

6) *In school, I achieve:*

- Mostly A's
- Mostly B's
- Mostly C's
- Mostly D's
- Mostly F's

7) *When it comes to school:*

- I get good grades, but don't need to work hard.
- I get good grades, but really have to work for them.
- I don't get good grades and still work hard.
- I don't get good grades, but I also don't work very hard.

8) *Do you drink caffeinated beverages?*

- Yes
- No

9) *What type of caffeinated do you normally drink?*

- Energy Drinks (i.e., Red Bull, Monster, etc.)
- Coffee/ Tea
- Energy Boosters (i.e., 5 Hour Energy)
- Soda

() Other - Write In: _____

10) I don't think I could do as well in school without consuming caffeine.

() Strongly Agree () Agree () Neutral () Disagree () Strongly Disagree

11) I often feel I need caffeine to help me concentrate in class.

() Strongly Agree () Agree () Neutral () Disagree () Strongly Disagree

12) I often feel I do not have enough energy to complete my school work.

() Strongly Agree () Agree () Neutral () Disagree () Strongly Disagree

13) I often procrastinate when it comes to school work.

() Strongly Agree () Agree () Neutral () Disagree () Strongly Disagree

14) I drink the most caffeine during this time of the day.

() Morning

() Afternoon

() Evening

() Night

15) How many caffeinated beverages do you drink a day?

16) I feel I need caffeine to get me through my day.

Strongly Agree Agree Neutral Disagree Strongly Disagree

17) I often choose beverages with high amounts of caffeine.

Strongly Agree Agree Neutral Disagree Strongly Disagree

18) I drink more caffeine when I have a lot of school work due.

Strongly Agree Agree Neutral Disagree Strongly Disagree

19) I often drink caffeine when doing homework.

Strongly Agree Agree Neutral Disagree Strongly Disagree

20) I feel I could accurately accomplish school work without caffeine.

Strongly Agree Agree Neutral Disagree Strongly Disagree

21) I feel caffeine helps me with.

Sustained energy

Better mood

No difference

Other - Write In: _____

22) I struggle more with school when I do not drink caffeine.

Strongly Agree Agree Neutral Disagree Strongly Disagree

23) I drink the most caffeine during this time of the semester.

Beginning

Middle (Mid-Terms)

End (Finals)

24) I feel that I have an addiction to caffeine.

Strongly Agree Agree Neutral Disagree Strongly Disagree

THANK YOU!

Thank you for your interest in my study. This study is being conducted in order to tell if there is any correlation between a student's academic performance and their caffeine consumption.

I hypothesized that there would be a negative correlation between academic performance and caffeine consumption. Meaning, that as caffeine consumption increases, academic performance will decrease.

If you are interested in obtaining the final results of this study, or if you have any questions or concerns regarding any portion of this study, please do not hesitate to contact me now or in the future. I will potentially present this project at The Third Annual Student Research Symposium and Exposition (SRSE) that Lindenwood University is hosting on April 20, 2016. The results of the study will also be available in the Advanced Research Method's class journal (www.mnlresearch.weebly.com) Dr. Michiko Nohara-LeClair will publish at the end of the Spring 2016 semester. My contact information is found at the bottom of this letter.

Thank you again for your valuable contribution to this study.

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