

# The Effects of Chewing Cinnamon Flavored Gum on Mood, Feeling and Spelling Acquisition

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## Abstract

The purpose of the study is to investigate if the effects of chewing cinnamon flavored gum can increase mood, feeling and spelling acquisition. 5th grade students (n=22) at Ilshin elementary school in South Korea served as participants. The same students were required to take 4 spelling tests with 1 given every day over the course of 4 days. For the 1<sup>st</sup> day, students were required to answer pre-questionnaires pertaining to mood and feeling before studying the spelling words. Students were then given 15 minutes to study while using the rote learning techniques to memorize spelling words; however, they were not given any gum. Afterwards, students were required to take the spelling test to determine memorization achievement. Lastly, students were required to retake the post-questionnaires based on mood and feeling again. On days 2-4 the same protocol was performed, however with 5, 10 or 15 minutes of gum chewing. The results indicated that in terms of the test scores, 15 minutes of chewing resulted in better performance than 5 or 10 minutes of chewing. However, there were no significant outcomes related to the mood and feeling scores. Future research should examine the type of information used for the memorization task, since recall vs. recognition tasks may be differentially affected by chewing.

**Keywords:** cinnamon flavored gum, mood, feeling and rote learning achievement

## 1. Introduction

### 1.1 Purpose of Study

The purpose of this study is to investigate if chewing cinnamon flavored gum can increase mood, feeling and memorization achievement. Although students may be intrinsically motivated to study very hard before a spelling test, the problem is that students may not be doing it effectively if their mood, feeling, working memory and alertness are not functioning at a high or positive level. There is limited research as to how chewing cinnamon flavored gum can improve these effects so that students can score higher on their spelling test. This study is designed to investigate if chewing gum for a longer period of time can improve learning for 5<sup>th</sup> grade students in an academic learning environment. 4 different time intervals, 0, 5, 10, and 15 minutes were used in this experiment because working memory and alertness may further improve with increased amount of chewing gum over time (Onyper, Carr, Farrar, & Floyd, 2011).

## 2. Literature Review

### 2.1 Background of Study

Educational psychologists have recognized that using learning strategies may increase academic achievement (Wilson & Kim, 2016). Rote learning is a technique based on repetition in which students may be able to quickly and efficiently recall information (Li, 2011). Rote learning is widely used so that participants can quickly process the meaning of material as it is repeated until stored as memory (Plunkett & Marchman, 1993). Although rote learning may help students to retain knowledge, chewing gum may further enhance academic achievement. Gum is a form of substance made out of chicle which is a latex sap rubber that comes from sapodilla trees. It is also a cohesive substance designed for chewing flavored with cinnamon (Meyer & Fawcett, 2008). Chewing gum may

help with rote learning because the brain will be able to store data faster into working memory due to the fact that glucose is sent into the bloodstream faster and the release of insulin can significantly improve brain power (Stephens & Tunney, 2004). When students chew gum it can also improve their ability to concentrate due to increased attention span and level of alertness (Hinaro & Onozuka, 2015). According to Onyer et al., (2011) the effects of chewing gum may be most effective within 15-20 minutes. Students that chewed gum within that allotted amount of time were able to recall 25-50 percent more items on a battery of tests showing a list of 30 words displayed one at a time. However, students that chewed gum past the 20 minute mark showed memory levels drop back to baseline. Because of these findings, we hypothesize that if students chew gum for a longer period of time before the 20 minute mark then memorization can be achieved through higher vocabulary spelling test scores.

Although there is significant evidence that chewing gum may improve memory, we hypothesize that if students do not have positive mood and feeling while they are studying then it can hamper learning and memory achievement. Mood and feeling are defined as an emotional state of how people feel at a particular place and time. People's mood and feeling can be based on outside influences such as stimuli. For example, if students are in a stressful learning environment it can hinder performance levels. Such stimuli can occur due to detectable sensitivity changes in either the external or internal atmosphere (Forgas, 1998). The reason why mood and feeling are important is because negative mood may hinder the process in which students can process new information in an academic setting. Negative mood can also further lead to lower levels of metacognition and negatively affect performance even before learning occurs (Brand, Reimer, & Opwis, 2007). It is possible this negative mood can be altered through the administration of cinnamon scent. According to Raudenbush, Grayhem, Sears and Wilson (2009) not only can cinnamon scent enhance motivation, alertness and performance but it can also decrease fatigue and serve as a central nervous system stimulant. In addition, cinnamon scent may reduce symptoms of stress and frustration. Cinnamon also has a number of health benefits which may ultimately increase mood and feeling because it contains anti-inflammation and antioxidant properties which can help the body fight infections, repair tissue damage, slow cells from dying and help the body with weight management. Cinnamon may also reduce the risk of heart disease, lower blood pressure and reduce levels of cholesterol and triglycerides within the body (Anderson, 2008). Cinnamon is known to correct cognitive impairment and decrease Alzheimer's disease which is the progressive deterioration of the brain (Frydman-Marom et al., 2011).

## *2.2 Research Questions & Hypotheses*

Based on the literature review, it is predicted that chewing cinnamon flavored gum will increase memorization achievement through higher test scores. It is also predicted that mood and feeling will be increased as well.

1. Do the effects of chewing cinnamon flavored gum for a longer period of time help further improve mood and feeling for the majority of elementary students?

1-1. Elementary students that chew cinnamon flavored gum for a longer period of time will further increase mood and feeling more than those who chew for a shorter period of time.

1-2. Elementary students that chew cinnamon flavored gum for a shorter period of time will not increase mood and feeling as much.

2. Do the effects of chewing cinnamon flavored gum for a longer period of time help further improve rote learning achievement for the majority of elementary students?

2-1. Elementary students who chew cinnamon flavored gum for a longer period of time will increase rote learning achievement more.

2-2 Elementary students who chew cinnamon flavored gum for shorter periods of time will not increase rote learning achieve as much.

## **3. Method**

### *3.1 Participants*

A total of twenty-two 5<sup>th</sup> grade elementary students participated in the study. All participants were from the same elementary school in South Korea and the study took place from Feb 15-19, 2016 after 1:00 pm. Participants were recruited by teachers in every 5th grade class. Flyers were produced to promote the study and distributed to all 5th grade students. To ensure that CITI policy was in effect, all students were required to return a signed letter of consent from their parent or guardian. Those students that did not bring back a letter of consent did not participate in the study and were dismissed.

### 3.2 Procedures

Students were required to take 4 spelling tests with 1 given every day over the course of 4 days. With the exception of day 1, all students were given a piece of Trident cinnamon flavored gum and a napkin to put on top of their desk before the experiment began. Then students were required to fill out the pre-mood and feeling questionnaire. Afterwards, the researcher handed out a piece of paper with 20 spelling words appropriate for Korean 5<sup>th</sup> graders studying ESL. Then students were required to listen and repeat while the researcher pronounced all 20 spelling words 2 times each. For the subsequent days of testing new spelling words were used to replace the previous words from the last testing. Afterwards, students were required to study on their own for 15 minutes using the rote learning technique. Lastly students were required to take the spelling test to determine memorization achievement and answer the post-questionnaires pertaining to mood and feeling. The only difference between days 2-4 is that students were given gum and chewed it during their study time before they took the spelling test. For the 2<sup>nd</sup> day, students were required to chew gum for 5 minutes while they were studying. After the time has elapsed, students were required to remove the gum and resume studying for the remaining 10 minutes. For the 3<sup>th</sup> day students had 10 minutes and for the 4<sup>th</sup> day 15 minutes of chewing gum before they were required to remove the gum and resume studying. The rest of the procedures were the same. The reason why we chose 0, 5, 10, 15 minutes was because there is enough evidence to support greater increase in academic performance if students chew gum for a longer period of time before the 20 minutes.

### 3.3 Materials

YBM English 5<sup>th</sup> grade textbook was selected because the spelling words for this experiment were designed for Korean 5<sup>th</sup> grade students. The testing materials were created and administered by YBM ECC which is a professional English language school supported by the Republic of Korea that creates testing material for kindergarten, elementary and middle school students.

### 3.4 Measures

Students responded to a modified Mood and Feeling scale. The original version used a three-step scale; however, for more accuracy we expanded into a 5-point Likert scale with 1 representing strongly disagree to 5 representing strongly agree. All questionnaires had been translated in Korean and distributed to all participants

**Mood and Feeling** was used to assess participant's current level of how they felt before and after taking the spelling test. The Mood and Feeling scale was created and validated by (Angold et al., 1995). The scale consists of thirteen questions, such as "I felt miserable or unhappy" and "I thought I could never be as good as other kids." The questionnaire has been found to have internal validity between 0.85 and 0.87 and test-retest reliability of 0.75 (Costello et al., 1991).

### 3.5 Data Analysis

SPSS 23 (IBM, Somers, NY, USA) and Microsoft EXCEL 2010 (Microsoft, Washington, USA) were used to input data. Descriptive statistics were used on all variables to determine the minimum, maximum, mean and standard deviation. Repeated measures ANOVAs were used to determine if chewing cinnamon flavored gum can increase mood, feeling and memorization through higher spelling test scores.

## 4. Results

### 4.1 Demographic Characteristics

The sample consisted of 22 5<sup>th</sup> grade students. The mean age was 12.86 years ( $SD=0.35$ ), males (45.4%,  $n=10$ ) females (54.5%,  $n=12$ ). All respondents were native Korean and their native language was Korean while English was their 2<sup>nd</sup> language.

### 4.2 Descriptive Statistics

The statistical descriptions of variables are noted in the following table

Table 1. Data for test, mood and feeling

Variable	N	Min.	Max.	Mean	SD
0 Minute Spelling Test	22	3.00	20.00	13.46	5.09
0 Minute Pre-Mood and Feeling	22	1.00	4.76	1.88	1.08
0 Minute Post-Mood and Feeling	22	1.00	4.69	1.94	1.19
5 Minute Spelling Test	22	1.00	20.00	12.45	5.87
5 Minute Pre-Mood and Feeling	22	1.00	4.61	1.90	1.13
5 Minute Post-Mood and Feeling	22	1.00	4.61	1.86	1.13
10 Minute Spelling Test	22	4.00	20.00	12.09	4.93
10 Minute Pre-Mood and Feeling	22	1.00	4.84	2.09	1.28
10 Minute Post-Mood and Feeling	22	1.00	4.69	1.98	1.24
15 Minute Spelling Test	22	7.00	20.00	14.09	4.65
15 Minute Pre-Mood and Feeling	22	1.00	4.61	1.94	1.16
15 Minute Post-Mood and Feeling	22	1.00	4.30	1.67	0.99

#### 4.3 Results (Research Question 1)

A repeated measures analysis of variance was performed on the test scores across the four gum conditions (0,5, 10 and 15 minutes of chewing). A significant effect was found among the gum conditions,  $F(3,63)=5.23$ ,  $p=.003$ ,  $\eta^2_{\text{partial}}=.20$ ,  $\text{Power}=.91$ . LSD pairwise comparisons indicated performance in the no gum chewing condition ( $M=13.46$ ,  $SE=1.09$ ) was greater than the 10 minute gum chewing condition ( $M=12.09$ ,  $SE=1.05$ ),  $p=.002$ . Additionally, performance in the 15 minute gum chewing condition ( $M=14.09$ ,  $SE=.99$ ) was greater than both the 5 minute and 10 minute gum chewing conditions,  $p=.04$  and  $.001$ , respectively.

#### 4.4 Results (Research Question 2)

A repeated measures analysis of variance was performed incorporating pre- and post-ratings on the 13 mood and feeling scores across the four gum conditions. No significant effect was found among the four chewing gum conditions,  $F(3,63)=.38$ ,  $p=.77$ ,  $\eta^2_{\text{partial}}=.02$ ,  $\text{Power}=.12$ . No significant gum condition x mood and feeling score x pre/post effect was found,  $F(36,756)=.87$ ,  $p=.69$ ,  $\eta^2_{\text{partial}}=.04$ ,  $\text{Power}=.87$ .

### 5. Discussion

In conclusion, the purpose of the study was to determine if the effects of chewing cinnamon flavored gum can increase mood, feeling and spelling acquisition. The test scores indicated that 15 minutes of chewing resulted in better performance than 5 or 10 minutes of chewing. However, there were no significant outcomes related to the mood and feeling scores. Chewing gum enhances test scores because the brain is able to store data faster into working memory. This is due to glucose entering the bloodstream faster and the release of insulin significantly improving memory function (Stephens & Tunney, 2004). Onyer et al. (2011) research supports this because chewing gum can be most effective within 15-20 minutes. According to their research, students that chewed gum within that allotted amount of time were able to recall 25-50 percent more items on a battery of tests showing a list of 30 words displayed one at a time. In addition, students that chew gum will also improve their ability to concentrate due to increased attention span and level-of alertness (Hinaro & Onozuka, 2015). However, according to the second part of our research, mood and feeling scores did not increase. This may be due to some indicating that the scent of cinnamon within the gum was too strong, thus potentially inversely affecting mood and feeling scores. According to Fotland, Paulsen, Sanner, Alexander and Husøy (2012) too much cinnamon can have an adverse health effect due to its coumarin content. Coumarin is a fragrant crystalline compound  $C_9H_6O_2$  that may damage the liver and thin the bloodstream. Too much coumarin can also cause increased heart rate and perspiration. Since the gum in the present study has a high coumarin concentration, it may have caused students to react negatively. The limitations of our study did not include any data on the student's diet. It is very possible that some students may have exceeded the amount of cinnamon that could have impacted our results.

Suggestions for future research on this topic would include a complete analysis of the student's diet before and after the study. Further studies should also address hedonic ratings of the scent made by the participants, as these could serve as covariates for mood and feeling assessments. Next, due to our low participant numbers and

limited time, our study used ANOVA repeating measures; however, we believe that a control group and a pre-test should be implemented to compare the effects of both groups through ANOVA multiple regression. Lastly, since learning a second language may be stressful for Korean students it might be beneficial to add a stress level scale to see if there are any covariates to the present variables used in this experiment.

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### Appendix A

**1<sup>st</sup> day spelling words-** name, desk, classroom, window, door, chair, Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, pencil, case, under, table, box, tall, sky and big

**2<sup>nd</sup> day spelling words-** tower, bird, city, bank, school, church, right, left, straight, breakfast, lunch, dinner, study, homework, bed, big, small, long, ear and hair

**3<sup>rd</sup> day spelling words-** shopping, swimming, hiking, skating, fishing, camping, school, boat, notebook, eraser, ruler, chopstick, fork, knife, cake, spoon, wash, jump, kick, clean,

**4<sup>th</sup> day spelling words-** make, run, house, bedroom, kitchen, bathroom, backyard, museum, telephone, park, zoo, river, yesterday, play, watch, listen, speak, boy, meet and white

### Appendix B

#### 1. Questions on Mood and Feeling (Angold et al., 1995)

- 1) I felt miserable.
- 2) I didn't enjoy anything at all.
- 3) I felt so tired I just sat around and did nothing
- 4) I was very restless
- 5) I felt I was no good anymore
- 6) I cried a lot
- 7) I found it hard to think properly or concentrate
- 8) I hated myself
- 9) I was a bad person
- 10) I felt lonely
- 11) I thought nobody really loved me
- 12) I thought I could never be as good as other kids
- 13) I did everything wrong.

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