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## The Effects of Aromatherapy on Alertness in an Inclusion Setting

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### INTRODUCTION

Many adolescents place their heads down and close their eyes throughout the duration of a class period. Sleeping during instructional time directly affects the academic performance of a student. Participation is very difficult for those who have low attention levels. To ensure each student is provided with the greatest opportunity to achieve their highest potential academic learning gain, it is vital that each student is actively engaged throughout the lesson plan. Increasing a student's potential to master the material relies heavily on the level in which the student is interacting with the three predominate learning styles: auditory, visual and kinesthetic. If a student is sleeping during the instructional period in which these learning styles are being addressed, the student's potential to master the criteria decreases significantly. Individuals who have low attention levels force teachers to disrupt the learning environment of other students as the teacher interrupts their instruction time to provide verbal cues for a student to sit up or wake up. Teachers are often at a loss when faced with the dilemma of how to avoid disrupting their instructional time by continually having to pause the lesson in order to prompt motivation and maintain the attention of students who perpetually sleep during the duration of the class period without breaking the attention and learning environment of the other students within the classroom. Research within the field of aromatherapy places an emphasis on investigating the effect of different essential oils on precise brain centers. The available research indicates the effectiveness of aromatherapy and the use of essential oils, such as eucalyptus and peppermint, to stimulate specific brain centers that are known to regulate an individual's attention level. It is the lack of research regarding the effects of aromatherapy on alertness across multiple settings that makes the research of the effects of aromatherapy on alertness in an inclusion classroom vital. This research will provide further insight to not only how specific essential oils stimulate the brain to enhance alertness, but also the effects of specific fragrances of aromatherapy on alertness in various settings.

## LITERATURE REVIEW

The body of literature is very limited in the field of alternative medicine, including aromatherapy. Using several professional databases, including EBSCO, ERIC, Oxford Journals and APA, only a few articles addressed the topic of the effects of eucalyptus and peppermint aromatherapy on an individual's level of alertness in the setting of an inclusion classroom. The work of Llmberger indicates that aromatherapy is difficult to investigate due to the numerous factors that must be considered and the various tests that must be used in order to measure these considerations during the investigation (Llmberger et. al., 2000). However, Reiner's work suggests that based on the research available, essential oils used in aromatherapy are among the most effective alternative treatments of brain, body and emotional disorders. These essential oils contain diminutive chemical particles that are carried through the oxygen cells to the brain which then can cross the blood-brain barrier and can directly heal the brain and or body (Essential Oils for ADD and ADHD 2007). The results from the limited research available provide the field of alternative medicine with the conclusive results that certain oils and oil components of aromatherapy can be used as effective alternative treatments for those who suffer from brain, body and emotional disorders. These results imply that this field has a need for more research and investigations to determine the full effects of aromatherapy and the various fields and disorders in which aromatherapy may be used as a treatment.

The research journal entitled "The Influence of Essential Oils on Human Attention. I: Alertness" by Josef Llmberger et. al., states that nearly all aspects of human behavior are linked to the process of attention with the basic level defined as alertness, which ranges from a state of sleep to a state of being awake. This journal investigates the influence of essential oils and various components of oils, including peppermint and components of the eucalyptus oil and the measured effects these oils had on the intervals of attention function, defined as the speed of processing. The journal discussed the levels of alertness of the six experimental groups, which were measured in an A-B design, as the reaction times were monitored and recorded of the participants receiving the essential oils through inhalation versus those in the control groups receiving water through inhalation. The results of this research convincingly suggested that there was a significant positive correlation between the difference in ratings and motor reactions of those who were exposed to the inhalation of essential oils and components of essential oils versus the negative correlation between those who were exposed to the inhalation of water and their reaction times (2001). The results of Llmberger's research methods convinced later researchers to further investigate the effects

of the influence of essential oils on an individual's alertness to determine if the same results would be demonstrated when there is an alteration of the setting in which the aromatherapy was introduced. Since LImberger's research provided evidence that a positive correlation exists between the effects of aromatherapy on alertness, this research can be further investigated to determine the effects of aromatherapy on alertness in alternative settings, such as an inclusion classroom.

"Essential Oils and the Brain" by Victoria Anisman-Reiner states that essential oils have the capability of enhancing learning and study skills as oxygen cells containing the fragrance molecules cross the blood-brain barrier and are carried to the brain, stimulating various brain centers that enhance attention levels. Based on research, several oils are predominately known for their ability to enhance an individual's level of alertness, resulting in the advance in an individual's ability to focus. Anisman-Reiner states that the inhalation of the essential oil peppermint and components of eucalyptus is identified as oils that stimulate and refresh the brain. The fragrance of peppermint awakens the mind and the components of eucalyptus oil are recognized as the best oil to boost and heighten one's energy level (Essential Oils and the Brain 2007). This article provides researchers with a valuable understanding of the effects of essential oils on the brain based on current research. This information enables researchers to investigate the effects of different essential oils on alertness when these oils are introduced in alternative settings, such as an inclusion classroom. From this research, future researchers could extend the results and further investigate the effects of these oils proximity to a target subject on the extent of the subject brain stimulation.

### **METHOD**

The target subject was a seventeen-year-old African-American female. Based on the most current psychological information, the student has an IQ of 76. The student is currently being served through the PEC program under Emotional Behavioral Disorder. The investigation of the effects of aromatherapy on alertness in an inclusion setting took place in an eleventh grade American Literature inclusion classroom. In this particular inclusion setting, the regular education teacher and special education teacher jointly implemented the inclusion method of "one teach one drift." Throughout the duration of this class period, the teacher incorporates three learning styles including auditory, visual and kinesthetic styles. The teacher provides a learning environment that actively engages the students and requires constant participation throughout the instructional period. The failing grades of the student have been drastically affected due to her lack of participation as a

result of her low alertness levels.

An ABA single subject design was employed in order to investigate the effects of aromatherapy, using the essential oils of peppermint and eucalyptus, on alertness in an inclusion classroom. For this particular research, a low level of alertness was defined as a student placing their head on their desk with their eyes closed, while a student actively participating with their head off their desk demonstrated a high level of alertness. The level of alertness is recorded based on a tally system. For this tally system, a low level of alertness is defined as having been provided five or more verbal cues from the teacher to wake up and participate, thus indicating low alertness levels. High alertness levels can be defined as having fewer than five frequency tallies (refer to Diagram B). Each day of each phase the test subject was exposed to the fragrances, in which the placebo of water and essential oils emitted from an aromatherapy burner lit prior to the beginning of instruction in the American Literature class and continuously burned throughout the duration of the class period. The test subject inhaled the elements in which the aromatherapy burner emitted into the air. As the test subject inhaled these elements, this allowed the elements to begin the process of affecting the specific brain centers. During the A Phase, a placebo of water was introduced for the duration of five days. Introducing a placebo of water during the A Phase was crucial to increase the validity of the effects of the essential oil introduced during the B Phase. The burning of the placebo of water decreased the opportunity for the results to reveal that the effects of aromatherapy on alertness in an inclusion classroom were based on psychological phenomena. During the B Phase, the intervention of essential oils, including peppermint and eucalyptus, was introduced for the duration of five days. During the final A Phase a placebo of water was reintroduced for the duration of an additional five days. During each phase the researcher observed the levels of alertness, which were measured by the frequency in which the student was provided with a verbal cue to wake up and participate. For each time the student was given a verbal prompt, the researcher placed a tally under the corresponding phase and day in order to record the levels of alertness during the implementation of the placebo versus the implementation of the intervention of aromatherapy. During each Phase of this research the researcher collected data through observational means on the class as a whole. However, data were recorded on one student.

## RESULTS

Data was recorded during each day of every phase using a tally sheet. This tally sheet documented the following observations: the phase, the day, the total hours of sleep acquired each night based on the sleep pattern chart from

Diagram A, the frequency tally of how many times the student's head was placed on the desk, and the student's level of alertness. The average total hours of sleep recommended for a teenager is approximately 8-12 hours of sleep per night. Diagram A illustrates that the target subject consistently acquired fewer total hours of sleep per night than what is recommended, and at no point during any phase of the research did the target subject acquire between 8-12 hours of sleep. When observing investigation results from the research in Diagram B, it can be implied that for this research, since the target subject maintained a consistent total hours of sleep per night and did not acquire more than the recommended 8-12 hours of sleep per night, the sleep variable was not a factor for the alteration of the level of alertness recorded during each phase of the research. Both Diagrams A and B illustrate that, for this research, there is a negative correlation between the total hours of sleep acquired by the target subject and the effects of aromatherapy on alertness in an inclusion classroom. This further implies that this research has maintained its validity by ensuring the results from the investigation of the effects of aromatherapy on alertness in an inclusion setting are not influenced by alternative variables. By using documented research to eliminate the possibility that the alternative variable of sleep patterns was not a source for the alteration of the test subject's level of alertness, it can be inferred that the source for the alteration of alertness levels was directly caused by the aromatherapy intervention. By observing the frequency tallies of each phase it can be observed that in Phase A, when the placebo was introduced, the target subject revealed extremely low levels of alertness for each day. During Phase B of the research, the intervention of the aromatherapy essential oils were introduced, drastically altering the target subject's level of alertness as the target subject displayed significantly high levels of alertness when compared to Phase A. It was during Phase B, when the intervention of the essential aromatherapy oils of peppermint and eucalyptus were introduced, that the target subject reached a baseline of one frequency tally for duration of three consecutive days. In order to provide proof that a behavior alteration was based on the introduction of an intervention, it is vital to determine the consistency of the target subject's behavior without the implementation of the intervention. To further support the cause of the drastic alteration of alertness that was demonstrated during Phase B, the researcher found consistencies in behaviors demonstrated by the target subject without the intervention of aromatherapy. Identifying consistencies in the target subject's behaviors allowed the researcher to conclude that the drastic alteration in alertness levels was based on the implementation of the aromatherapy intervention. When referring to Diagram B it can be inferred that the target subject demonstrated consistent behaviors of low levels of alertness during the duration of the first and second A Phases.

Based on the consistent demonstration of low levels of alertness during the implementation of the placebo of water, the drastic alterations that occurred during Phase B were a result of the target subject being introduced to the intervention of the essential aromatherapy oils of peppermint and eucalyptus. This provides substantial evidence that there is a positive correlation between the effects of aromatherapy and alertness in the inclusion classroom.

## **DISCUSSION**

As documented in Diagram B, the target subject demonstrated consistent behaviors of low levels of alertness during the duration of the first and second A Phases, in which the target subject was introduced to the placebo of water. The consistent demonstration of low levels of alertness during the implementation of the placebo of water suggest that the drastic alterations that occurred during Phase B were a result of the target subject being introduced to the intervention of the essential aromatherapy oils of peppermint and eucalyptus. This provides substantial evidence that there is a positive correlation between the effects of aromatherapy and alertness in the inclusion classroom.

Current research suggests the investigation of the effects of aromatherapy on alertness is difficult due to the various limitations throughout the research (Llamberger et. al. 2000). One limitation to the investigation of the effects of aromatherapy on alertness in an inclusion setting includes the variables outside of the school that have the potential to influence an individual's level of alertness. For example, in this study, the amount of sleep in which the target subject acquired may directly affect the level of alertness. Determining the amount of sleep an individual acquired during the night, based on the number of times and duration they remained in REM, was an important factor in determining the target subject's level of alertness prior to the implementation of the placebo and essential aromatherapy oils. For instance, it was important to know if the target subject acquired over the recommended hours of sleep for her age range prior to the implementation of the placebo and essential aromatherapy oils. This knowledge of the target subject's sleep patterns maintains consistency in the research of the effects of aromatherapy and alertness in an inclusion setting and avoids including research that could potentially address the effects of the number hours of sleep an individual obtains each night on alertness in an inclusion classroom. If it was documented that the target subject did acquire over the recommended hours of sleep for their age range, this could be factored into any positive correlations between the investigations of the effects of aromatherapy on alertness in an inclusion setting. In order to obtain true documentation of the sleep patterns of the

target subject, the researcher would need to have access to specific machines that would measure the brain waves to determine how many times the test subject fell into REM and the duration of each REM pattern. In order to account for the limitation of measuring the individuals sleep patterns and still uphold a consistent level of integrity for the research, the researcher maintained a sleep pattern chart that documented the number of sleep hours the test subject acquired each night of every phase, in which this variable of sleep is measured in terms of from the time the test subject went to bed until the time the test subject awoke the following morning. The sleep patterns recorded be observed by referring to Diagram A.

An additional limitation to this research was based on the awareness of the degree in which the elements within the essential oils stimulate the specific brain centers may differ among individuals. In order to determine the degrees in which the elements within the essential oils stimulate specific brain centers may be monitored through the use of an EEG or EKG machine that provides data regarding the degree of an individuals brain stimulation.

A final limitation to this research is that the data was collected through an independent observer system. In order to better protect the integrity of this research and provide more precise observation results, continuations of this research should be conducted through the use of a multiple observer system.

The researcher recorded the results from a single subject. However, the researcher documented observations of specific individuals within the same setting as the target subject. For instance, the researcher observed that during the first A phase there was a student in the far back right hand corner of the room who demonstrated low levels of alertness, just as the target subject. However, the aromatherapy oil burner was placed in close proximity to the target subject in order to ensure that the target subject inhaled an adequate of the essential aromatherapy oils of peppermint and eucalyptus. Had the target subject not been provided the opportunity to inhale adequate amounts of the oil element, this could have interrupted the stimulation process of the specific brain centers, providing invalid results for this investigation. The target subject demonstrated significant alertness levels when the intervention of aromatherapy was introduced during Phase B of the research. However, the researcher observed that during the same B Phase, in contrast to the target subject who demonstrated a significant gain in alertness level during this phase, the student in the far back corner still demonstrated low levels of alertness. However, it is important to note that the sleeping habits of the student in the far back corner of the room were not acquired.

The data collected over the duration of this research provided the field of alternative medicine with research-based evidence that a positive correlation exists when investigating the effects of aromatherapy on alertness in an



inclusion setting. However, based on the results of this investigation and observations gathered from other subjects in the same setting, there are several steps that could be implemented over the duration of each phase to further this investigation. For instance, further research could be conducted to determine the effects of the proximity of essential aromatherapy oils being burned on the level of alertness. Another step that could be implemented to further this investigation of the effects of aromatherapy on alertness is to continue researching the effects of aromatherapy on alertness across different settings.

## **APPENDIX AND FIGURES**

### Appendix A: Letter to Parents

Dear Parent/Guardian,

My name is Ms. Czar and I am a Georgia College and State University Student Teacher in the Special Education cohort. Over the next few weeks I will be conducting a research project in order to satisfy the requirements for a course. Prior to the implementation of this research project I will need the signature of approval for me to conduct this research and share all documentation of results to my college advisor. This research will include your child being present in the inclusion setting while the burning essential oils of aromatherapy, including peppermint and eucalyptus, are present during the duration of one class period. Your assistance and signature would be greatly appreciated as I continue furthering my education in the field of research. Lastly, your as a research participant, your child will bring home a sleep chart in which I will need you, as the guardian to document the total hours of sleep your child gets on a nightly basis, from the time they go to bed till the time they awake in the morning, for the duration of three weeks. Thank you for your patience and participation in this project.

Ms Czar

Guardian Signature \_\_\_\_\_

Diagram A: Sleep Pattern Chart

Week # 1

| <u>Day of the Week</u> | <u>Total Hours of Sleep</u> |
|------------------------|-----------------------------|
| Monday                 | 6                           |
| Tuesday                | 6                           |
| Wednesday              | 5                           |
| Thursday               | 7                           |
| Friday                 | 6                           |

Week #2

| <u>Day of the Week</u> | <u>Total Hours of Sleep</u> |
|------------------------|-----------------------------|
| Monday                 | 7                           |
| Tuesday                | 6                           |
| Wednesday              | 6                           |
| Thursday               | 5                           |
| Friday                 | 7                           |

Week #3

| <u>Day of the Week</u> | <u>Total Hours of Sleep</u> |
|------------------------|-----------------------------|
| Monday                 | 7                           |
| Tuesday                | 7                           |
| Wednesday              | 6                           |
| Thursday               | 5                           |
| Friday                 | 7                           |

Diagram B: Research Tally Sheet

Phase A: Implementation of placebo, water

| Days of Week | Total Hrs. Of Sleep Previous Night | Frequency Tally of how many times the students was provided with a verbal cue to wake up and participate. | Levels of Alertness |
|--------------|------------------------------------|---|---------------------|
| Monday:      | 4                                  | 1111111111111 (13)  | Low                 |
| Tuesday:     | 6                                  | 11111111 (8)  | Low                 |
| Wednesday:   | 5                                  | 111111111111 (11)   | Low                 |
| Thursday:    | 5                                  | 11111111 (7)  | Low                 |
| Friday:      | 4                                  | 1111111111111 (12)  | Low                 |

Phase B: Implementation of Intervention, Peppermint and Eucalyptus Essential Oil

| Days of Week | Total Hrs. Of Sleep Previous Night | Frequency Tally of how many times the students was provided with a verbal cue to wake up and participate. | Levels of Alertness |
|--------------|------------------------------------|---|---------------------|
| Monday:      | 5                                  | 111 (3)   | High                |
| Tuesday:     | 4                                  | 11 (2)  | High                |
| Wednesday:   | 6                                  | 1 (1)   | High                |
| Thursday:    | 7                                  | 1 (1)   | High                |
| Friday:      | 6                                  | 1 (1)   | High                |

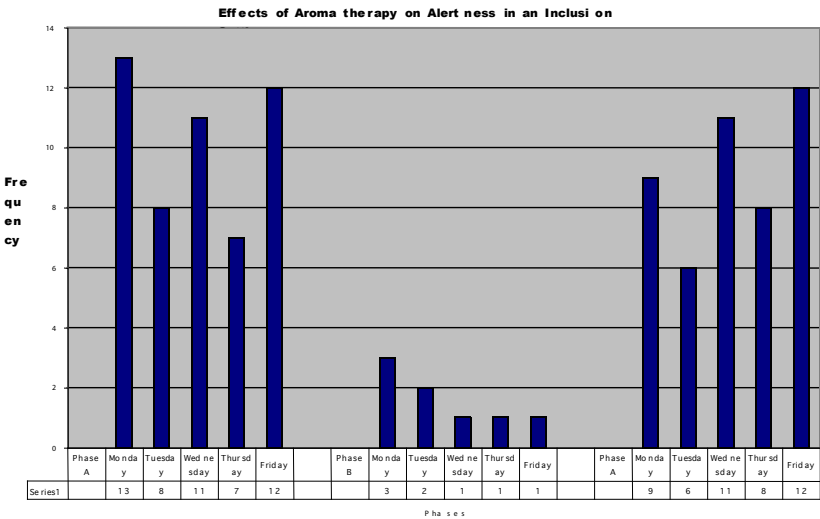
## Effects of Aromatherapy on Alertness

### Phase A: Implementation of Placebo, water

| Days of Week | Total Hrs. Of Sleep Previous Night | Frequency Tally of how many times the students was provided with a verbal cue to wake up and participate. | Levels of Alertness |
|--------------|------------------------------------|---|---------------------|
|--------------|------------------------------------|---|---------------------|

|            |   |                   |     |
|------------|---|-------------------|-----|
| Monday:    | 6 | 1111111111 (9)    | Low |
| Tuesday:   | 6 | 111111 (6)        | Low |
| Wednesday: | 4 | 111111111111 (11) | Low |
| Thursday:  | 5 | 11111111 (8)      | Low |
| Friday:    | 4 | 111111111111 (12) | Low |

Figure 1: The Effects of Aromatherapy on Alertness in an Inclusion Setting



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