Advances in Nursing Science & Research

doi: 10.39127/ANSR:1000102

Fernandez MLF, et al. Ad Nurs Sci Resear: ANSR-102.

Review Article

The Effect of Lavender Aromatherapy to Junior Nursing Students' Anxiety, Concentration and Memory Retention

Marc Louise F. Fernandez*, Maria Veronica P. Ferrer, Kamille Anne B. Flores, Alissa Iris A. Florido, Kristine Ivy L. Foronda, and La.Arnie M. Lazalita, R.N., M.A.N.

College of Nursing, University of Santo Tomas, España Boulevard, Manila, Philippines

***Corresponding author:** Marc Louise F. Fernandez, College of Nursing, University of Santo Tomas, España Boulevard, Manila, Philippines 1015. Email: nicaferrer0911@gmail.com

Citation: Fernandez MLF, Ferrer MVP, Flores KAB, Florido AIA, Foronda KIL, et al. (2018) the Effect of Lavender Aromatherapy to Junior Nursing Students' Anxiety, Concentration and Memory Retention. Ad Nurs Sci Resear: ANSR-102.

Received Date: 14 August, 2018; **Accepted Date:** 17 August, 2018; **Published Date:** 24 August, 2018

Abstract

Background: *Anxiety can negatively affect individual's performance in school. This can further influence physical and mental health of students in terms of concentration and memory retention. Several studies have shown that lavender aromatherapy was effective in reducing anxiety, improving concentration and increasing memory retention.*

Methods: *Pre-post intervention with a quasi-experimental design was used. A total of 55 participants completed the pre-test as well as the post-test tools. A pre-test of each tool (S-TAI (form Y-1), Stroop Effect Assessment Tool and Return Demonstration Checklist) was obtained as a baseline data for the study. Subsequently, lavender aromatherapy was diffused 30 minutes per session in an enclosed room. After the intervention, anxiety, concentration and memory retention were measured through a post-test of each tool.*

Results: *Paired t-test revealed in the three tests were considered to be significant ($p<0.000$), justifying the effectiveness of the use of lavender aromatherapy in curtailing the anxiety as well as improving the concentration and increasing memory retention of junior nursing students.*

Conclusion: *The use of lavender aromatherapy could be used to decrease anxiety, improve concentration and increase memory retention. Thus, lavender aromatherapy may be a substitute to promote cost effective and non-pharmacologic intervention that will be advantageous for nursing students*

Keywords: Aromatherapy; Lavender; Concentration; Anxiety; Memory Retention; Nursing

Introduction

Psychological stress in the nursing profession is no longer extraordinary. Stress and anxiety have also been identified as significant issues experienced by student nurses during their education. Increased stress begins in nursing school. Upon admission to a nursing program, the typical nursing curriculum includes heavy course loads, stringent examinations, and continued pressure to attain a high grade point average in a competitive environment [1,2]. In addition to personal stressors such as work and family, students in undergraduate nursing programs experience high levels of stress and anxiety in competitive programs of study in which both didactic and clinical coursework are covered simultaneously.

Stress negatively impacts students' physical and mental health [3] and hinders academic performance and completion rates [4,5]. Anxiety is a major obstacle to learning in the clinical setting that may result in students being unable to perform and impairs cognition while trying to perform. While a moderate .

level of anxiety is needed for learning to occur, a high level of anxiety results in decreased learning [6].

A limited number of articles were generated regarding stress and anxiety in nursing students requiring an expansion of the search to 1995. This may reflect current lack of interest in this topic as a research focus even though in the contemporary nursing education environment students report stress and anxiety as concerns.

The advancement of complementary therapies is timely, for studies about student nurses' anxiety have been explored; interventions are now being searched for. One of the interventions that are being considered is the use of Complementary alternative medicines. It is believed that nature is the best chemist [7] and these methods give nurses a mean of demonstrating care at a more independent level. According to [8], the controlled use of essential oils for treatment is defined as aromatherapy and it is one of the alternative medical methods used in many countries [9] also defined aromatherapy as a systematic use of essential oils that offers relaxation and symptomatic relief to improve the sense of well-being. The method used in aromatherapy is the release of odor to a particular environment.

The most commonly used in controlled trials has been Lavender [10-16]. Lavender aromatherapy claimed to have the effects of decreasing anxiety [17], improving cognitive learning [16] and enhancing short term memory [10].

Literature Review

Aromatherapy

Aromatherapy is one of the Complementary Alternative Medicines (CAM) which is as an intervention for nursing care, especially in the United States, showing the fastest growing type of CAM treatment [18]. Aromatherapy is considered to be part of the alternative and complementary therapies of health that is not part of the established medical care. The term "complementary" is used when the practice is associated with the traditional medicine of the Occident, complementing the treatment. Nurses are practicing aromatherapy historically and worldwide nowadays. Aromatherapy is already being supported by the Federal Nursing Council in Brazil [8].

A scientific study by Hongratanworakit, Heuberger & Buchbauer (2008) [19] are proved benefits of aromatherapy in mental health care includes reduce stress and anxiety and aid relaxation.

Aromatherapy is used in hyperactive children to raise memory and concentration. It has been proven that aromatherapy has a significant impact on cognitive, functions attention level and memory, better psychological condition and decreasing levels of stress. Aromatherapy in a classroom setting may contribute to the development of a positive environment, a comfortable learning ambiance that may activate students to listen actively [16].

Anxiety

Anxiety is a confusing sensation that is deteriorated when a person experiences prolonged, unresolved stress or multiple stressors [20] like stress, mild anxiety can have an effect on academic outcomes positively because mild levels of anxiety can escalate efficiency and intellectual functioning.

A study by Perry & Perry in 2006 [21] as also acknowledged in [18], states that essential oils either applied dermally or inhaled have the effects similar to that of the pharmacological treatments. In line with this, the anxiolytic drug chlordiazepoxide was compared to the reaction of lavender oil and merely exhibited the same anxiolytic properties as of chlordiazepoxide. Oral lavender oil preparation was compared to lorazepam with generalized anxiety disorder patients. The six-week-intake of lavender exhibited that it has improved generalized anxiety disorder unlike lorazepam. Lavender was compared to diazepam – another anxiolytic drug, and still presented the same anti-anxiety effect to female gerbils [22]. Also, The Harvard Medical School: Harvard Health Publishing [23] indicated that there are systematic reviews that presents evidence of benefit from the use of lavender to relieve anxiety.

Concentration

Concentration as defined by Tigner & Robert (1999) [24] as the ability to give something an undivided attention to the exclusion of other distractions. Most students report dissatisfaction with their ability to concentrate and feel they do not work as efficiently as they would like.

A computerized cognitive assessment battery was used to measure the impact of lavender aromatherapy on the cognitive performance and mood in healthy volunteers. It is capable of maintaining a good mood throughout the entire session. To add to this, subjects who are exposed to lavender have fewer errors made in mathematical and letter counting tests as well as memory related skill [25].

In a study done by Diego et al. (1998) [26], it included faculty and staff members of a University. The subjects were asked to hold a 100mL plastic 3 inches from their nose for a total of 3 minutes while breathing normally. Math computations were given prior and subsequently the aromatherapy session to be able to determine the alertness and concentration of the participants. The results from the EEG revealed that participants were more alert and were able to complete math computations faster. In addition to this, accuracy scores were improved after the lavender aromatherapy session.

Memory retention

According to Amin (2013) [27], memory is essential as it enables people to learn new and different skills to perform every phase of life. Different brain mapping techniques, memory paradigms, neuroscientists, and psychologists identified three memory processes: Retention, Encoding, and Recall. Memory retention is defined as the capacity that permits humans to benefit from past experiences that is related to every situation and skill that is being performed [28].

A study investigated that lavender aromatherapy has a differential effect in salvia species on memory and mood. [29] Studied the effects of S. officinal is aroma and S. lavandulaefolia aroma in one hundred and thirty-five healthy respondents' cognitive performance. They found out that the group who received the aromatherapy performed significantly better than the control group in terms of quality of memory and secondary memory from the test battery. These findings deliberately determined that aromatherapy have significantly improved the memory retention of the volunteers.

It has also been examined by Jackson (2010) [30] the effects of stimulating and soothing smell in heart rate and memory of students. The researcher used the soothing scent of lavender and the stimulating scent of lemon. All the participants were given the same two sets of memory tasks under different testing conditions with the use of letter and pictures as memory and recall tests. She found out that there was a decrease in the heart rate and improved memory in the group given with lavender scent.

Research Hypotheses

H1: There is a significant decrease on the level of anxiety of junior nursing students before undergoing return demonstration
H2: There is a significant improvement in the level of concentration the junior nursing students after receiving lavender aromatherapy
H3: There is a significant improvement in the level of memory retention of the junior nursing students after receiving lavender aromatherapy.

Operational Definitions

The effects of Lavender aromatherapy on junior nursing students' anxiety, concentration and memory retention will be tested through a pre-post test of 3 tools. First, the State-Trait Anxiety Intervention Tool to test the level of anxiety. Second, The Stroop Effect Tool to test concentration and lastly, the Return demonstration assessment tool to test memory retention. The scores from the tests will be compared and analyzed.

Theoretical Framework

Florence Nightingale, the proponent of modern nursing provided a clear, unequivocal direction for nursing. She described healing as an innate and natural process. According to her, the goal of nursing is to put a person in the best possible condition in order for nature to act [31]. The environmental theory of Florence Nightingale states that nurses needs to manipulate or utilize the environment to help clients move towards optimum health. According to the environmental theory, alteration in a person's environment will have a significant change in their health.

In one of Florence Nightingale's pioneer work, Notes on nursing (1969), she emphasized elements of the environment that could be altered. Three of these elements are essential to the use of aromatherapy. First, ventilation and cleanliness. According to Nightingale, nurses should always keep the air pure and sources of odors should be eliminated. For Nightingale, foul air inhibited the natural healing process. This is supported by the study of Rotton in 1983 (as cited by Johnson, 2011) [29], who found that exposure to a malodor (ethanethiol) negatively affected performance on a complex task but not a simple mental arithmetic task and he also argued that malodors exert analogous detrimental effects on attention like other sensory pollutants such as noise.

Second, Florence Nightingale emphasized the importance of rest and relaxation. Nightingale recognized the harmful effects of anxiety, apprehension, and uncertainty, and encouraged nurses to eliminate sources of these states. She directed those providing care to create environments that is conducive and peaceful to facilitate improvement of health. This is because the olfactory sense has a unique intimacy with emotion. Unlike other senses, olfactory neuroanatomy is intertwined with primary emotion areas including the amygdala, hippocampus, and Orbit Frontal Cortex (OFC) [33-35]. This results to a correlation between the olfactory perception, and affective experience of a person [36,37].

The third is sensory variety or changes in environmental conditions. Florence Nightingale asserted that the form, color, light or simply changes in the environmental conditions affects a person. The environment plays an important role and contributes as a facilitator to natural healing and restoration of the patient. It is vital that integral harmony in the interrelationship person-environment is achieved for maximum health.

Essential oils like lavender when diffused in the environment through inhalation are carried up to olfactory cells in the brain wherein the hypothalamus is stimulated and signals are then sent to influence mood and behavior [38]. This theory has been supported by the study of McCaffrey et al., (2009) [39] in which they concluded that by altering the environment of graduate nursing students by diffusing aromatherapy, the stress of the students during test-taking decreased which can in turn result to decreased test stress and anxiety by providing a calm environment. In a similar study by Filiptsova & Gazzavi-

Rogozina [10], they noted that the use of lavender essential oil resulted to enhanced short-term memory, an improvement to the reaction time of memory, as well as the attention span.

According to Jellinek in 1997 (as cited in Johnson, 2011) [32] there are four potential mechanisms that might explain the odor-induced cognitive facilitation. The first is because of an odor-specific pharmacological mechanism, wherein volatile compounds enter the bloodstream following inhalation and impact neural activity which predicts odor-specific effects (such as a feeling of goodness). The second explanation is an epiphenomenal hedonically-driven mechanism, wherein effects on cognition are secondary to the increase in mood following odor exposure. The third is that odor effects are purely psychological, in that a prior belief or expectancy pertaining to the qualities of the odor support any benefits. This claim is true and can impact and individual's cognition when the participant is aware of the odor's presence and the participant possesses a belief that the odor should induce specific effects. The final explanation is a contextual or associative account. It is said that odors have specific effects because their presence has been associated with a particular stimulus, mood or behavior. From a memory perspective, this account would predict that if a participant learnt material in the presence of a specific odor, re-presentation of that odor would operate as a subsequent cue to recall for the learnt material.

The environmental theory of Florence Nightingale is a framework that provides a foundation for theory-guided nursing practice in the field of aromatherapy. Similar to this study, the researchers modified the environment in order to promote reduction of anxiety, enhancement of concentration and improvement of memory retention.

Methods

Research Design

Aquasi-experimental research was utilized in this study which is used to establish a cause and effect relationship between an independent and dependent variable. A single group was used in the study due to the fact that the researchers used the lavender aromatherapy for the first time. To add to this, it is used to test treatments outside of the laboratory [40]. The results of the pre-assessment were compared to the assessment after being exposed to the treatment.

Subjects and Setting

The study was conducted in a select University in Metro Manila. The population consists of junior nursing students who are currently enrolled in the first semester of school year 2017-2018. Inclusion criteria set by the researchers are: scheduled for return demonstration for the day, and willing to participate. However, a student will be excluded from the study if he/she has medical problems such as 1) asthma and other respiratory problem; 2) has other pharmacological and medical treatment; 3) with olfactory problem; 4) with known allergies; and 5) has present illness on the day or 2 weeks prior to the day of implementation.

The classroom that was used has enough space for the aromatherapy for the students to smell. According to [41], the size of classroom should be approximately 10-16m2 so that the aromatherapy would be effective. It was also ensured by the researchers that the room will be quiet and free from any distractions and foul odor.

Research Instruments and Tool

The researchers used a total of four (4) tools for the study. The first instrument utilized was an assessment tool to screen the subjects' health and other medical history. The second questionnaire, The Spielberg State-Trait Anxiety Inventory for Adults (Form Y-1), was used to measure the subjects' level of anxiety at present. It is reported to be reliable and valid self-rating assessment in research and clinical practice [42]. The State Trait Anxiety Inventory for Adults is a self-evaluation questionnaire that is divided into 2 parts with both having a 20-item, 4 point Likert scale. The chosen subjects were the ones to answer both questionnaires which would only pertain to a genuine description of how and what they are feeling as they take the test. The researchers obtained its reliability by testing if the tool used was appropriate. A cronbach's alpha of 0.906 was computed from a pilot test having a sample of 20 respondents.

The third tool that was used was the Stroop Effect assessment tool whch is used to assess an individual's cognitive processing speed, their attention capacity, and their level of cognitive control. This will be used to assess the second variable in the study, which was concentration. This stool has a cronbach's alpha of 0.823 which was also computed from a pilot test having a sample of 20 respondents.

The last tool that was utilized was the Skills Laboratory Checklist. The checklist was accomplished by the researchers to assess the subjects' memory retention. A cronbach's alpha of 0.876) was computed from a pilot test having a sample of 20 respondents to measure its reliability and internal consistency.

Data Collection Procedure

Data gathering was done for 2 weeks during the month of November. Junior nursing students enrolled in NCM 103, Skills Laboratory in the first semester of school year 2017-2018 were randomly selected to participate in the study. First, the researchers checked the schedule of Junior Nursing students and chose what section to get using Fishbowl technique. After choosing the section that may be part of the study, the researchers obtained consent from the professors who are handling the chosen section. Using fishbowl technique, researcher chose 15 respondents per session.

The chosen students were given an informed consent with full explanation about the voluntary nature of their participation. After obtaining the informed consent, the students were screened by assessing their health history through the use of questionnaires to be answered by the students themselves. Students who have medical problems were excluded from the study.

After a thorough assessment of their health history, the subjects who have met the inclusion criteria were given the State-Trait Anxiety Inventory for Adults questionnaire (Form Y-1) which measured their level of anxiety before the intervention. The same questionnaire was given to the subjects after the return demonstration to determine if the intervention had an effect on the students' anxiety after the return demonstration.

After answering the S-TAI for Adults questionnaire (Form Y-1), the subject's concentration was then tested using the Stroop Effect Assessment Tool. The researchers administered the test by asking the subjects to read a list of words, but the words were printed in a color different to the word itself. After the Stroop effect, the subjects had their pre-return demonstration assessment through an objective checklist scored by the researchers.

After completing the pre-return demonstration, the subjects were then scheduled for aromatherapy before the actual return demonstration starts. Prior to the aromatherapy procedure, the researchers asked the students to void in order to avoid distractions during the data collection. Students were asked to refrain from leaving the room once the session has started. These measures ensured that there were no alterations in the effects of aromatherapy.

The lavender aromatherapy was carried through inhalation after instilling 0.25 milliliters essential lavender oil diluted to 50 milliliters of water into an ultrasonic ionizer aromatherapy diffuser. In the aromatherapy session, the respondents were given 30 minutes to be exposed to lavender scent. Immediately after the intervention, the State-Trait Anxiety Inventory for Adults questionnaire (Form Y-1) was administered to measure their level of anxiety; Stroop effect assessment tool for concentration and; return demonstration to the respective clinical instructor post-intervention.

Data Analysis

Data were entered into the Statistical Package for Social Science version 21.0.0 software. A cronbach's alpha of 0.906 (S-TAI), 0.823 (Stroop effect assessment tool), 0.876 (Return Demonstration Sheet) were computed from a pilot test having a sample of 20 respondents. Thus, the instruments used met the minimum reliability coefficient as recommended by [43] and is therefore reliable. The instrument may be used for the data collection of the aforementioned research paper. Descriptive statistics, specifically the mean, was used to identify the average scores of the participants, both in the pre-tests and post - tests. The study results were analyzed using a paired t-test to determine the significant difference of the three tests.

Ethical Considerations

Institutional policies were followed including ethical approval of the study site and of the Ethics Review Board. The researchers obtained written consent from junior nursing students after providing full disclosure of the study's benefits, risks, background as well as the respondent's rights according to their level of understanding. Prior to the implementation of the study, researchers briefly mentioned how inhaling the lavender essential oil at a certain period of time entails no harm, instead intent to lower their anxiety before performing a demonstration and boost their concentration and achieve a higher return demonstration score. The participants also received an explanation about the voluntary nature of their participation and that withdrawal from the study for any reason will not cause the subjects penalty or harm.

The researchers ensured that data confidentiality was observed through which the researcher did not disclose any personal information to anyone who were not involved in the study. Privacy was made certain for the procedure was held in an enclosed room. Those people who were not part of the study were not allowed to enter inside the room therefore preventing possible distractions. In addition to these, anonymity was ensured through the use of class numbers when referring to the participants.

Prior to the data collection, legitimate screening of the subjects was done. Health history was obtained from the participants to certify that the subjects were in optimum health before the study took place. Upon the implementation, the presence of a professional nurse was available to ensure that every action of the researchers was made correspondingly to the nursing standards and were ethically appropriate all throughout. Also, a physician will be available in case medical intervention will be needed in the situation. The inclusion and exclusion criteria were meant to assure patients' safety during the study. These have been made so as to verify that the chosen subjects were eligible to join the study. These were also meant to minimize withdrawal events and to make sure that primary end-points of study were reached.

The lavender that was used in the intervention was certified by the Bureau of Food and Drug (BFAD) with the License to Operate (LTO) number CCRR-NCR-CT-0458 to safeguard the appropriateness and safety of the product.

Tokens of appreciation were given to the subjects and also to those excluded ones after each session. To continuously promote the well-being of the participants, assistance was readily provided if the need arises. In case of any allergic reactions, the researchers will initially assist the participants in going to the university health service for a more meticulous assessment on the condition and to be able to provide primary

care. In addition to this, the researcher also ensured that the chosen school is located near a tertiary hospital for emergency situations that will be accompanied by two of the experimenters and the health professionals present during that time. In line with this, the researchers will shoulder all medical expenses, inclusive of the prescribed medications/maintenance drugs, hospitalizations, transportation, as well as possible rehabilitations.

Although the administration of essential oils through the oral and topical route reported to have side effects such as gastrointestinal upset, and nausea & vomiting, several literature reviews have revealed that no specific side effects were noted with the use of aromatherapy oils via inhalation. Hence, the advantages of the study outnumbered the risks.

Results

These data were tabulated, statistically treated, and analyzed. Tables 1 – 3 showed the results of the t – tests conducted to correlate the means of the pre-and post- tests scores for each tests. The results presented were considered to be significant having a p<0.000 values in all three variables, justifying the effectiveness of the use of lavender aromatherapy in curtailing the anxiety as well as improving concentration and increasing memory retention of junior nursing students in a select university in Metro Manila, Philippines.

Anxiety

The mean score of the pre – test in State-Trait Anxiety Tool (**Table 1**) was 47.70 (SD = 11.05) and the post – test obtained a score of 36.90 (SD = 10.95) signifying higher levels of anxiety as compared to after administering the intervention.

Pretest		Posttest				
Mean	SD	Mean	SD	t-Value	Sigficance	p-value(Two-tailed)
47.7091	11.05319	36.9091	10.95829	10.192	S	.000

*Significant at ≤ 0.05 level SIGNIFICANT

Table1: Within-Group Comparison of STAI among Level III Students (N =55).

Concentration

The scores of the participants in the Stroop Effect (**Table 2**) prior to the intervention was 7.08 (SD = 1.79) that decreased to 5.23 (SD=1.26), which also denotes that students had noticeably improvements in terms of their concentration after the exposure to lavender aromatherapy.

Pretest		Posttest				
Mean	SD	Mean	SD	t-Value	Sigficance	p-value(Two-tailed)
7.0804	1.79792	5.2349	1.26535	8.647	S	.000

*Significant at ≤ 0.05 level SIGNIFICANT

Table 2: Within-Group Comparison of STROOP among Level III Students (N = 55).

Memory Retention

While the pre- and post- test scores in their Return Demonstrations (**Table 3**) displayed mean scores of 122.12 (SD = 22.84) and 138.27 (SD = 21.50) respectively, showing an increase in their memory retention.

Pretest		Posttest				
Mean	SD	Mean	SD	t-Value	Sigficance	p-value(Two-tailed)
122.1273	22.84493	138.2727	21.505577	13.300	S	.000

*Significant at ≤ 0.05 level SIGNIFICANT

Table3: Within-Group Comparison of Return Demonstration among Level III Students (N =55).

Discussion

The result in (Table 1) can be supported by the study of [44] wherein the effect of aromatherapy in reducing nursing student's test anxiety was examined. The results concluded that there is a statistically significant difference between the control and the experimental group (p<0.05). Thus, proving that aromatherapy can reduce the anxiety of nursing students.

The significant change in the aspect of concentration may be due to another effect of lavender that can increase the alertness of students therefore reducing the time of the completion of the test provided. In a study conducted by Diego et al. (1998) [24] to test the alertness among faculty and staff members of a university, math computations were given prior and after the aromatherapy session. The results from the EEG revealed that participants were more alert and were able to complete math computations faster. This is also supported by the study of Ali, Ghadiri, Gorji and Koulivand (2013) [45] that lavender aromatherapy can significantly affect the rate of errors made in the mathematical and letter counting tests. In the presence of the odor of lavender, the subjects made lesser errors.

The positive effect of the lavender aromatherapy in the improvement of memory was also due to another proven benefit of lavender in improving the memory retention of junior students. The study of Filiptsova et al. in 2017 [10] conducted with 79 secondary students used memory for images and memory for numbers as a tool to evaluate their memory. Results showed that there was statistically significant difference between the memory recall of control group and memory recall of the two experimental groups. They noted that the use of lavender essential oil yielded to enhanced short-term memory, an improvement to the reaction time of memory, as well as the attention span.

Conclusion

Anxiety prior to return demonstration is high among Filipino nursing students which affects their performance. Findings from this study revealed that lavender aromatherapy delivered via diffuser decreases anxiety, improves concentration and increases memory retention. Lavender aromatherapy is an inexpensive, safe and easy therapy for Filipino nursing students. Therefore, the use of lavender aromatherapy must be included in the regular academic learning environment of nursing students.

Limitations

This study focuses on the immediate effect of lavender aromatherapy to third year nursing students' anxiety, concentration and memory retention in a selected university in Metro Manila. This study will not test other proven benefits of lavender.

References

1. Chernomas WM, Shapiro C (2013) Stress, depression, and anxiety among undergraduate nursing students. Int J Nurs Educ Scholarsh 7: 10.
2. Crary P (2013) Beliefs, behaviors, and health of undergraduate nursing students. Holist Nurs Pract 27: 2.
3. Diagnostic and Statistical Manual of Mental Disorders (2013), Fifth Edition. Arlington, VA, American Psychiatric Association: 189-190.
4. Reeve KL, Shumaker CJ, Yearwood EL, Crowell NA, et al. (2013) Perceived stress and social support in undergraduate nursing students' educational experiences. Nurse Educ Today 33: 4.
5. Goff AM (2011) Stressors, academic performance, and learned resourcefulness in baccalaureate nursing students. Int J Nurs Educ Scholarsh 8: 1.
6. Jeffreys MR (2007) Tracking students through program entry, progression, graduation, and licensure: assessing undergraduate nursing student retention and success. Nurse Educ Today 27: 5.
7. Melincavage SM (2011) Student nurses' experiences of anxiety in the clinical setting. Nurse Education Today 31: 785-789.
8. Buckle J (2015) Clinical Aromatherapy: essential oils in healthcare. St. Louis, Missouri: Elsevier LTD.
9. Gnatta JR, Kurebayshi LF, Turrini RN, da Silva MJ (2016) Aromatherapy and nursing: historical and theoretical conception. Revista da Escola de Enfermagem da USP 50: 1.
10. American College of Health Association (2015) National college health assessment spring reference group executive summary.
11. Dyomina Y, Filiptsova OV, Gazzavi-Rogozina LV (2017) the effect of the essential oils of lavender and rosemary on the human short-term memory. Alexandria Journal of Medicine.
12. Ahamad A, Ali B, Anwar F (2015) Essential oils used in aromatherapy: a systematic review. Asian Pacific Journal of Tropical Biomedicine 5: 601-611.
13. Cooke M, Fu C (2013) A randomized controlled trial of the use of aromatherapy and hand massage to reduce disruptive behavior in people with dementia. BMC Complement Altern Med 13: 165.
14. Ghadiri M, Gorji A, Koulivand P (2013) Lavender and the nervous system. Evidenced-Based Complementary and Alternative Medicine: 1-10.
15. Kasper S, Gastpar M, Muller WE (2010) Efficacy and safety of silexan, a new, orally administered lavender oil preparation, in subthreshold anxiety disorder-evidence from clinical trials. Wiener Medizinische Wochenschrift 160: 547-556.
16. Beal PV, Harden OC (2010) the effects of aromatherapy scents on the ability to recall information: 1-19.
17. Aydın K (2006) İlköğretim birinci kademe IV. Sınıf öğrencilerinin İngilizce dersindeki öğrenmeleri üzerine aromanın etkileri. Fırat Üniversitesi Sosyal Bilimler Enstitüsü Yüksek Lisans Tezi, Elazığ.
18. Kasper S, Gastpar M, Muller WE et al. (2010) Silexan, an orally administered Lavandula oil preparation, is effective in the treatment of'subsyndromal' anxiety disorder: a randomized, double-blind, placebo controlled trial. International Clinical Psychopharmacology 25: 277-287.
19. Janca A, Watt G (2008) Aromatherapy in nursing and mental health care. Company Nurse 30: 1-8.
20. Heuberger E, Ilmberger J, Hartter E, Buchbauer G (2008) Physiological and behavioral effects of 1,8-cineol and (±)-linalool: a comparison of inhalation and massage aromatherapy. Natural Product Communications 3: 1103-1110.
21. Atkinson RC, Shiffrin RM (1968) Human memory: a proposed system and its control processes. The Psychology of Learning and Motivation: Advances in Research and Theory 2: 89-195.
22. Perry N, Perry E (2006) Aromatherapy in the management of psychiatric disorders: clinical and

23. neuropharmacological perspectives, CNS Drugs 20: 257-280.
24. Woelk H, Schlafke S (2010) A multi-center, double-blind, randomised study of the lavender oil preparation silexan in comparison to lorazepam for generalized anxiety disorder. Phytomedicine 17: 94-99.
25. Harvard Women's Health Watch: Aromatherapy's benefits limited to mood improvement (2008) Harvard health Publishing.
26. Tigner N, Robert B (1999) Putting memory research to good use: hints from cognitive. Psychology. Journal of College Teaching 47: 149-152.
27. Tysoe P (2000) the effect on staff of essential oil burners in extended care settings. International Journal of Nursing Practice 6: 110-112.
28. Diego M, Jones N, Field T (1998) Aromatherapy positively affects mood, eeg patterns of alertness and math computations. International Journal of Neuroscience 96: 217-224.
29. Amin H, Malik A (2013) Human retention and recall process. Neurosciences 18: 330-344.
30. Tulving E (1985) How many memory are there?. American Psychologist 40: 385-395.
31. Moss L, Rouse M, Wesnes KA, Moss M (2010) Differential effects of the aromas of salvia species on memory and mood. Human Psychopharmacology Clinical Expert 25: 388-396.
32. Jackson RN (2010) the effect of stimulating and soothing smells on heart rate and memory. McNair Scholars Journal 11: 97-110.
33. Kutlu AK, Yilmaz E, Çeçen D (2008) Effects of aroma inhalation on examination anxiety. Teaching and learning in Nursing 3: 125-130.
34. Johnson A (2011) Cognitive Facilitation Following Intentional Odor Exposure. Sensors 11: 5469-5488.
35. Carmichael, S. T., Clugnet, M.C., Price, J.L. (1994) Central olfactory connections in the macaque monkey. Journal of Complementary Neurology, 346:403-434.
36. Haberly LB (2001) Parallel-distributed processing in olfactory cortex:new insights from morphological and physiological analysis of neuronal circuitry. Chemical Senses 26: 551-576.
37. Gottfried JA, O'Doherty J, Dolan RJ (2003) Encoding predictive reward value in human amygdala and orbitofrontal cortex. Science 301: 1104-1107.
38. Khan RM, Luk CH, Flinker A, Aggarwal A, Lapid H, et al. (2007) Predicting odor pleasantness from odorant structure: pleasantness as a reflection of the physical world. Journal of Neuroscience 27: 10015-10023.
39. Yeshurun Y, Sobel N (2010) An odor is not worth a thousand words: from multidimensional odors to unidimensional odor objects. Annual Review of Psychology 61: 219-241.
40. D'Angelo R (2002) Aroma-therapy In Shannon, S (Ed), Handbook of complementary and alternative therapies in mental health San Diego, CA: Academic Press: 71-92.
41. McCaffrey R, Thomas D, Kinzelman A (2009) the effects of lavender and rosemary essential oils on test-taking anxiety among graduate nursing students. Holistic Nursing Practice 23: 88-93.
42. Cook TD (2015) Quasi-Experimental Design. Wiley Encyclopedia of Management 11: 1-2.
43. Krusemark E, Novak L, Gitelman D, Li W (2013) When the Sense of Smell Meets Emotion: Anxiety-StateDependent Olfactory Processing and Neural Circuitry Adaptation. The Journal of Neuroscience 33: 15324-15332.
44. Kyle G (2006) Evaluation the effectiveness of aromatherapy in reducing levels of anxiety in palliative care patients: Results of a pilot study. Complementary Therapies in Clinical Practice 12: 148-155.
45. Jon G (2012) Identifying and Treating Test Anxiety in School-aged Children, Carlos Albizu University, NewYork.
46. Kavurmaci M, Kucukoglu S, Tan M (2014) Effectiveness of aromatherapy in reducing test anxiety among nursing students. Indian Journal of Traditional Knowledge 1: 52-56.
47. Koulivand PH, Ghadiri MK, Gorji G (2013) Lavender and the nervous system. Evidence-Based Complementary and Alternative Medicine: 1-10.
48. Akhondzadeh S, Kashani L, Fotouhi A, et al. (2003) Comparison of lavandula angustifolia mill. tincture and imipramine in the treatment of mild to moderate depression: a double-blind randomized trial. Progress in Neuro-Psychopharmacology and Biological Psychiatry 27: 123-127.
49. Aronen E, Vuontela V, Steenari MR, Salmi J, Carlson S (2005) Working memory, psychiatric symptoms, and academic performance at school. Neurobiology of Learning and Memory 83: 33-42.
50. Baddeley AD, Thomson N, Buchanan M (1975) Word length and the structure of short term memory. J Verbal Learn Verbal Behav 14: 575-589.
51. Bamber MD, Schneider JK (2016) Mindfulness-based meditation todecrease stress and anxiety in college students: A narrative synthesis of the research. In Educational Research Review 8: 1-32.
52. Barocelli F, Calcina M, Chiavarini et al. (2004) Antinociceptive and gastroprotective effects of inhaled and orally administered lavandula hybrida reverchon grosso essential oil. Life Sciences 76: 213-223.
53. Bastard J, Tiran D (2006) Aromatherapy and Massage for Antenatal Anxiety: its effect on the fetus. Complementary Therapies in Clinical Practice: 48-54.
54. Bradley BF, Starkey NJ, Brown SL, Lea RW (2007) Anxiolytic effects of lavandula angustifolia odour on

55. the mongolian gerbil elevated plus maze. Journal of Ethnopharmacology 111: 517-525.
56. Buckle J (2001) the role of aromatherapy in nursing care. Nurs Clin North Am 3: 57-72.
57. Chow J, He W, Ngai S, Lau B, Tsang S,, Vidaña D (2017) The effectiveness of aromatherapy for depressive symptoms: A systematic review. Evidenced-Based Complementary and Alternative Medicine: 1-21.
58. Conrad P, Adams C (2012) the effects of clinical aromatherapy for anxiety and depression in the high risk postpartum woman-a pilot study. Complementary Therapies in Clinical Practice 18: 164-168.
59. Driscoll R (2007) Westside Test Anxiety Scale Validation, ERIC Document Reproduction Service, Montana State University.
60. Ernst E, Perry R, Telly R, et al (2012) is lavender an anxiolytic drug: a systematic review of randomized clinical trials. Phytomedicine 19: 825-835.
61. Eysenck MW (2001) Principles of cognitive psychology. Hove, East Sussex: Psychology Press.
62. Filipitsova OV, Gazzavi-Rogozina LV, Timoshyna IA, Naboka OI, Dyomina, et al. 2017) The effect of the essential oils of lavender and rosemary on the human short-term memory. Alexandria Journal of Medicine 7: 1-4.
63. Fujiwara C, Kimura R, Komai K, et al (2014) Effectiveness of aromatherapy in decreasing maternal anxiety for a sick child undergoing infusion in a paediatric clinic. Complementary Therapies in Medicine 22: 1019-1026.
64. Galbraith ND, Brown KE (2011) Assessing intervention effectiveness for reducing stress in student nurses: quantitative systematic review. Journal of Advance Nursing 67: 709-721.
65. Hadfield N (2001) the role of aromatherapy massage in reducing anxiety in patients with malignant brain tumors. International Journal of Palliative Nursing 7: 279-285.
66. Hadwin JA, Brogan J, Stevenson J (2005) State anxiety and working memory in children: a test of processing efficiency theory. Educational Psychology 25: 379-393.
67. Han SH, Kim KS, Lee MS, Rho KH (2006) Effects of aromatherapy massage on anxiety and self-esteem in korean elderly women: a pilot study. The International Journal of Neuroscience 116: 1447-1455.
68. Heather L, April L (2009) t5he relationship between test anxiety and academic performance. Missouri Western State University Egypt.
69. Hebb DO (1949) Organization of Behavior. Nheew York: Wiley. Herz, R. (2009). Aromatherapy facts and fictions: a scientific analysis of olfactory effects on mood, physiology and behavior. International Journal of Neuroscience 119: 263-290.
70. Holt FE, Birks TPH, Thorgrimsen LM, Spector AE, Wiles A, Orrell M (2003) Aroma therapy for dementia. Cochrane DS Syst Rev.
71. Hongratanaworakit T, Heuberger Em, Buchbauer G (2004) Evaluation of the effects of East Indian sandalwood oil and alpha-santalol on humans after transdermal absorption, Planta Medica 70: 3-7.
72. Huberty TJ (2009) Test and performance anxiety.Principal Leadership 10: 12-16.
73. Johnson CE (2014) Effect of aromatherapy on cognitive test anxiety among nursing students. Alternative and Complementary Therapies 20: 84-87.
74. Johnson K, West T, Diana S, Todd J, Haynes B, et al. (2017) Use of aromatherapy to promote a therapeutic nurse environment. In Intensive and Critical Care Nursing 40: 18-25.
75. Karaman T, Karaman S, Dogru S, Tapar H, Sahin A, et al. (2016) Evaluating the efficacy of lavender aromatherapy on peripheral venous cannulation pain and anxiety: a prospective, randomized study. In Complementary Therapies in Clinical Practice 23: 64-68.
76. Lapointe MLB, Blanchette I, Duclos M, Langlois F, Provencher MD, et al. (2013) Attentional bias, distractibility and short-term memory in anxiety. Anxiety, Stress & Coping 26: 293-313.
77. Lee YL, Wu Y, Tsang H, Leung A, Cheng WM (2009) A systematic review on the anxiolytic effects of aromatherapy in people with anxiety symptoms. The Journal of Alternative and Complementary Medicine 17: 101-108.
78. Lorig TS, Herman KB, Schwartz GE, Cain WS (1990) EEG activity during.
79. Mazzone L, Ducci F, Scoto C, Passaniti E, D'Arrigo G, et al. (2007) The Role of Anxiety Symptoms in School Performance in a Community Sample of Children and Adolescents. Catania Sicily, Italy.
80. McCaffrey R (2008) Using aromatherapy to reduce nursing student's stress: a pilot study. American Holistic Nurses' Association 28: 26-27.
81. McCraty R (2003) Enhancing Emotional, Social, and Academic Learning with Heart Rhythm Coherence Feedback. HeartMath Research Center, Institute of HeartMath, Boulder Creek, CA.
82. National Association of School Nurses (2012) Medication administration in the school setting.
83. Needham BL (2006) Gender differences in the consequences of depressive symptomatology for educational attainment, social support, and health risk behavior during the transition from adolescence to young adulthood. University of Texas.
84. Owens M, Stevenson J, Hadwin JA, Norgate R (2012) Anxiety and depression in academic performance: an exploration of the mediating factors of worry and working memory. School Psychology International 33: 433-449.
85.

86. Patterson SL (2016) the effect of emotional freedom technique on stress and anxiety in nursing students: A pilot study. Nurse Education Today 40: 104-110.
87. Savelev S, Okello E, Perry NSL, Wilkins RM, Perry EK (2003) Synergistic and antagonistic interactions of anti- cholinesterase terpenoids in Salvia lavandulaefolia essential oil. Pharmacology Biochemistry and Behavior 75: 661-668.
88. Sanderson H, Ruddle J (1992) Aromatherapy and occupational therapy. British Journal q/ Occupational Therapy 55: 310-314.
89. Unal S, Hisar F, Görgülü Ü (2012) Assertiveness levels of nursing students who experience verbal violence during practical training. Contemp. Nurse 42: 11-19.
90. Vernacchia R (2003) Inner strength. Palo Alto, CA: Warde Publishers, Inc.
91. Walsh E, Wilson C (1999) Complementary therapies in long-stay neurology in-patient settings. Nursing Standard 13: 32-35.