Case Study: Sleep Disturbances in Older Adults

Kristine Lauriello

New York City College of Technology

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1. What factors do you believe contribute to these differences? Include a minimum of five (5) factors with comprehensive explanations for each factor you identify that contribute to sleep disorders in older adults.

According to Charlotte Eliopoulos (2014), “several periods of relaxation throughout the day and a block of sleep help promote a healthy pattern of rest,” however, as one ages, “we may be restless and unable to obtain sufficient sleep in the presence of pain, stress, or impaired bodily functions” (p. 185). It has been found that some of the changes that the older population experiences in regards to sleep experiences are a higher prevalence of napping, daytime sleepiness, and insomnia - all due to changes that occur in their Circadian sleep-wake cycles, sleep stages, the efficiency and quality of their sleep, and the presence of sleep disturbances due to numerous factors (Eliopoulos, 2014, p. 186).

As Eliopoulos (2014) goes on to explain the changes that occur in the sleep-wake cycle, she describes that the older adult experiences a “phase advance,” where hours of sleep are not necessarily lost or gained, but *shifted*, causing those experiencing this change to “fall asleep earlier in the evening and awaken earlier in the morning”; this can, in fact, prove to be frustrating due to concerns regarding changes to their schedule that may arise and difficulties in adjusting to these changes (p. 186). The sleep stages of the older adult also undergo a series of changes, which have an affect on the quality of sleep the older adult will receive. Changes include, more time being spent in stage one, which according to Eliopoulos (2014), is where one “begins nodding off”, “can be easily awakened”, and “if undisturbed, will reach [the] next stage in a few minutes” (p. 187). It has been noted that an older adult does not really experience much change in the second stage of the sleep-wake cycle other than the possibility of remaining in it for a longer period of time than someone younger in age (Eliopoulos, 2014, p. 187). Here, a “deeper stage of relaxation is reached” than in stage one, “some eye movement [is] noted through closed lids,” and one “can be easily awakened” (Eliopoulos, 2014, p. 187). Stages three and four of the cycle are decreased in the older adult, causing a loss of quality “deep sleep” in these individuals (the body and its functions would usually experience relaxation, and it would be more difficult to awaken them) (Eliopoulos, 2014, p. 187). Lastly, it has been found that the REM (rapid eye movement) cycle is also reduced in older adults; a process that normally occurs once every 90 minutes of stage IV sleep lessens in occurrence due to the general lessening in the amount of sleep these people receive (Eliopoulos, 2014, p. 187).

Compounded with “*sleep latency*, a delay in the onset of sleep,” older adults also experience “increased awakening” from increased sensitivity to stimulations such as noises, lights, and fluctuating temperatures (Eliopoulos, 2014, p. 186). As indicated by Eliopoulos (2014), “approximately half of the adult population complains of sleep disorders” (p. 186), which include complaints of insomnia, nocturnal myoclonus and restless leg syndrome, sleep apnea, and several “health conditions, particularly chronic diseases, [that] can interfere with sleep by producing symptoms such as nocturia, incontinence, pain, orthopnea, apnea, muscle cramps, and tremors” (p. 188). There are also drugs and environmental factors that can affect the amount and quality of sleep an older adult receives (Eliopoulos, 2014, p. 188).

Eliopoulos (2014) defines insomnia as “difficulty falling asleep or staying asleep and/or premature waking”; it can be “a short-term (transient) problem associated with a changed environment, illness, added stress, or anxiety” or a “chronic insomnia (i.e., insomnia lasting 3 or more weeks)…related to physical or mental illnesses, environmental factors, substance abuse, or medications” (p. 187). Both nocturnal myoclonus and restless leg syndrome can cause “jerking leg movements during sleep [that] can cause awakenings during the night”; nocturnal myoclonus causing “at least five leg jerks or movements per hour” is “associated with the use of tricyclic antidepressants and chronic renal failure” and restless leg syndrome, “a neurological condition characterized by an uncontrollable urge to move the legs” due to the need to relieve themselves of different sensations felt in the legs (Eliopoulos, 2014, p. 187). Several causes of restless leg syndrome include, “iron deficiency anemia, uremia, or neurological lesions; it is believed to be associated with alterations in dopamine and iron metabolism” (Eliopoulos, 2014, p. 187). Also, consumption of several medications, “alcohol, caffeine…and simple and refined carbohydrates” can contribute, as well as, occurrences of hypoglycemia and dehydration (Eliopoulos, 2014, p. 187).

Sleep apnea is another sleep disturbance that is often experienced by the older adult, “in which [there are] at least five episodes of cessation of breathing, lasting at least 10 seconds, occur[ing] per hour of sleep, accompanied by daytime sleepiness” and is more prevalent in men and those who are overweight or obese (Eliopoulos, 2014, p. 188). This can be caused by the structural changes that occur to the respiratory system as one ages, including the relaxation of connective tissue in the nose, deviations, the presence of thickening secretions, and rigidity of the chest which limits expansion (Eliopoulos, 2014, p. 52). These changes combines with the recumbent position can prevent adequate respiration during sleep and result in apnea.

Changes occurring to the respiratory system have other affects on sleep aside from contributing to the presence of sleep apnea. According to Eliopoulos (2014), difficulty in the passage of air becomes prominent in the older adult for numerous reasons, including septal deviations, reduced secretions, thickening and hardening of mucus, thicker nostril hair, the stiffening of the trachea, the shrinking of the lungs and decrease in recoil, and “the loss of skeletal muscle strength in the thorax and diaphragm” (p. 253). The occurrence of COPD (and its components) in older adults will often cause sleep disturbances due to awakening from coughing, restricted airflow leading to hypoxia, and difficulty removing bronchial secretions (Eliopoulos, 2014, p. 257-258).

Parkinson’s Disease, a neurological condition more common in men and those over the age of 50, often present with several secondary symptoms, including sleep disturbances caused by muscle spasms, tremors, rigidity, feelings of frustration and irritability, and depression (Eliopoulos, 2014, p. 353). Older adults experiencing diarrhea from “medications, peptic ulcer, gastritis, ulcerative colitis, diverticulitis, diabetes, fecal impaction, tube feedings, and stress” may have higher incidences of sleep disturbance, as well as, those diagnosed with a hiatal hernia – these individuals may experience “heartburn, dysphagia, belching, vomiting, and regurgitation,” which are “especially problematic when the patient is recumbent” (Elipoulos, 2014, p. 295).

According to Eliopoulos (2014), urinary problems caused by the changes that the urinary system goes through during the aging process, are great contributors to the sleep disorders experienced by the older population.

One of the greatest annoyances is urinary frequency, caused by hypertrophy of the bladder muscle and thickening of the bladder, which decreases the ability of the bladder to expand and reduces storage capacity. In addition to frequency during the day, nighttime urinary frequency (nocturia) can be a problem. Often, kidney circulation improves when a person assumes a recumbent position, so voiding may be required a few hours after the individual lies down and at other times during the night. Age-related changes in cortical control of micturition also contribute to nocturia; this problem, along with incontinence (which is not a normal consequence of aging), can be noted in persons with dementia and other conditions affecting the cerebral cortex (p. 305).

The pressure exerted on the bladder from prostate enlargement can also have an affect on urinary frequency, which in turn can affect the amount and quality of sleep an older adult is receiving (Eliopoulos, 2014, p. 307). The frequent urge to urinate can cause many awakenings during sleep and can occasionally cause incontinent episodes.

There are several cardiovascular diseases that can affect the sleep of an older adult, specifically “conditions that produce nocturnal cardiac ischemia [which can] interfere with sleep due to the dyspnea and transient angina that occur” (Eliopoulos, 2014, p. 188). Ineffective tissue perfusion can cause hypotension, edema, dyspnea, decreased urinary output, delirium, and restlessness, and sleep patterns can be disturbed by impaired oxygen transport, immobility, hospitalization, pain, anxiety, inactivity, medications, and depression (Eliopoulos, 2014, p. 274). Hypotension, hypertension, and symptoms of coronary artery disease can have an affect on the sleep patterns of older adults, as well as, congestive heart failure, whose symptoms “in older persons include dyspnea on exertion (the most common finding), confusion, insomnia, wandering during the night, agitation, depression, anorexia, nausea, weakness, shortness of breath, orthopnea, wheezing, weight gain, and bilateral ankle edema” (Eliopoulos, 2014, p. 275). With this, the “age-related changes, such as reduced elasticity and lumen size of vessels and rises in blood pressure … interfere with the blood supply to the heart muscle” (Eliopoulos, 2014, p. 275).

2. How can you, as a gerontological nurse, promote effective sleep for Mr. Hayes? You must list a minimum of five (5) specific nursing interventions that can be implemented for the older adult that would improve sleep habits. Provide scientific rationales for each intervention.

As a gerontological nurse, I can promote sleep for Mr. Hayes by using pharmacological or nonpharmacological measures, and/or “measures to control pain” (Eliopoulos, 2014, p. 189). Obtaining a sleep history is critical in the accurate assessment of an older adult that may be experiencing a potential sleep disturbance or disorder, and should include a “review of time spent in sleep and naps, quality of sleep,” a “medication review,” the older adults “bedtime routines,” and the “presence of sleep disturbances, if present” (Eliopoulos, 2014, p. 189). After investigating Mr. Hayes’ activity schedule, I will encourage “more stimulation and activity during the day” and “provide insight into the advantages of pacing activities throughout the entire day and providing ample periods for rest and naps between activities” (Eliopoulos, 2014, p. 190).

The older individuals environment may need to be adjusted to provide for adequate sleep. According to Eliopoulos (2014), “exposure to sunlight during the day,” and other activities such as, warm baths, backrubs, or lying in a comfortable position will “promote muscle relaxation and encourage sleep” (p. 190). It is important to always pay attention to noise levels and room temperature when creating an ideal place for rest and sleep (Eliopoulos, 2014, p. 190). Thermoregulation becomes an issue affecting sleep due to the degenerative changes and capacity of the hypothalamus, decreasing normal body temperatures, and the “reduced ability to respond to cold temperatures due to inefficient vasoconstriction, decreased cardiac output, diminished shivering, and reduced muscle mass and subcutaneous tissue” (Eliopoulos, 2014, p. 64).

Further means of providing for a good nights sleep are the inclusion of specific foods and supplements in Mr. Hayes’ diet. For example, as per Eliopoulos (2014), foods high in carbohydrates and protein should be encouraged, for their “sedating effect” due to the presence of serotonin in them. Other sleep-promoting remedies and supplements (to be consumed at or around bedtime) include “valerian root tea or herbal tincture” and “melatonin (a synthetic form of the hormone that is naturally stimulated by darkness)” which “improve the quality of sleep in adults of all ages by correcting imbalances in the body’s circadian rhythm” (Eliopoulos, 2014, p. 190).

I would investigate Mr. Hayes’ sleep positions and explain to him the importance of avoiding falling asleep on his back because this position causes “the tongue to fall back and block the airway” (Eliopoulos, 2014, p. 188). If Mr. Hayes appears to be suffering from a potential diagnosis of sleep apnea, I would recommend avoiding “alcohol and other drugs with depressant effects [because] they can aggravate the problem by increasing respiratory drive and relaxing throat muscles” (Eliopoulos, 2014, p. 188). Another important factor to investigate for is the presence of stress. According to Eliopoulos (2014), “most individuals confront a variety of physical and emotional stressors daily, such as temperature changes, pollutants, viruses, injury, interpersonal conflicts, time pressures, fear, bad news, and unpleasant or difficult tasks” which “the body reacts by stimulating the sympathetic nervous system” which in turn will cause “stimulation of the pituitary gland, the release of adrenocorticotropic hormone, and an increase in the body’s adrenaline supply” (p. 191). Therefore, stress can cause sleep disorders and many other health disorders.

3. Describe five (5) complementary modality interventions that Mr. Hayes can use to promote sleep. To obtain maximum credit you must be very specific in your discussion and fully explain what each complementary modality is. Provide scientific rationales for each complementary modality that you have identified.

According to Shizheng, Jianshu, Shengii, Guihua, Zengxia, and Zhiling (2015), “exercise training has a moderately positive effect on sleep quality in middle-aged and older adults, and therefore, the physical exercise could be viewed as a complementary and alternative approach for treating sleep disturbances” (p. 369). Taichi, which is a “form of low- to moderate-intensity mind-body exercise, has a long practicing history for body and mind fitness” and when practiced, proves beneficial in “balance function and strength, cardiovascular and respiratory function, flexibility, immune system, symptoms of arthritis, muscular strength, and psychological effects” (Shizheng et al., 2015, p. 369). It has proven not only beneficial and helpful in promoting sleep and alleviating sleep disturbances, but has also been found safe for the older adult to practice. As per Shizheng et al. (2015), it is “performed slowly and gently with diaphragmatic breathing and relaxation, result[ing] in declined sympathetic output and enhanced feeling of well-being,” and due to it’s increase in “energy consumption, endorphin secretion, [and] body temperature” proves to be an ideal complementary modality intervention (p. 377).

As per Munk, Kruger, and Zanjani (2011), “high rates of persistent and acute pain have been reported by users of complementary and alternative medicine (CAM) including recipients of massage therapy (MT)”, which have shown positive effects “on back pain, carpal tunnel syndrome, arthritis, and other pain-related conditions” (p. 609). Massage has been defined by Eliopoulos (2014) as the “manipulation of soft tissue by using rubbing, kneading, rolling, pressing, slapping, and tapping movements (called bodywork when combined with deep tissue manipulation, movement awareness, and energy balancing” (p. 199). The aforementioned common sources of pain, along with “the changes that accompany aging (e.g., decreases in metabolism, muscle mass, resistance, and resilience)” cause many sleep disorders and prevent adequate rest and sleep (Munk et al., 2011, p. 609), but can be relieved or lessened with the use of massage therapy. Munk and Zanjani (2011) have found that, “older adults who reported massage therapy usage in the past year had significantly better health outcome scores in the following domains: 1) emotional well-being, 2) limitations due to physical issues, and 3) limitations due to emotional issues” (n.p.). The relaxing effect on muscles that a massage can cause can promote comfort and encourage sleep (Eliopoulos, 2014, p.190).

Another complementary modality that can be used to encourage a good night’s sleep is the participation in prayer, a means of “sharing and understanding life’s burdens” with a higher power (Eliopoulos, 2014, p. 191). According to Eliopoulos (2014), “the “unloading” of one’s problems during prayer can also be a rest-inducing activity in that it clears the mind of the day’s stresses” (p.191). Konecny (2012) states, “…religious practices such as prayer and worship services help develop [people’s] sense of meaning and purpose in life and nourish their spiritual needs,” (pp slide 21) which can soothe one’s mind of stressors and initiate relaxation and allow for a healthy and fulfilling sleep.

Acupuncture, “a mechanism…regulating *yin* and *yang* to reinforce health and eliminate the pathogenic” has been proven to improve sleep by “increasing the content in γ-amino butyric acid” and the body’s other natural painkillers (Cao, Pan, Li, & Liu, 2009, p. 1171). As per Zuppa, Prado, Wieck, Zaparte, Barbosa, and Bauer (2014), it has been “shown to be beneficial for immune functions, including T, B, and NK cells” and “in attenuating psychological distress and immnuosenescence” (p. 35). Furthermore, it’s “beneficial effects might be exerted by brain derived neurotrophic factor (BDNF) modulation, involved in cognition and peripheral immune functions,” and holds some responsibility in sleep regulation; it has been found that levels of BDNF, although significantly lower in the older adult, can be altered by “physical activity, stress, and acupuncture” (Zuppa et al., 2014, p. 36).

One last complementary modality intervention that Mr. Hayes can use to promote sleep is the use of herbal medicine. According to RxList (2009), there are several herbs and plants that can promote sleep in patients facing insomnia and other disorders. Some common ones used are valerian root, kava, and chamomile. Each acts upon the brain and central nervous system, causing a calming and relaxing effect, which can encourage sleep. Correct dosing is important and it is encouraged to discuss the potential use of these with one’s healthcare provider. Due to their sedating effects, it is recommended that those using these herbal remedies not consume other sedative medications or hepatotoxic drugs. Furthermore, patients should be cautioned not to drive or operate machinery after using any of the abovementioned herbs.

4. Investigate the following pharmacological options for sleep. Include the action, adverse effects, and nursing implications for each example you selected.

Herbal therapy (include 3 examples)

According to Rx List (2009), valerian is an herb that has a calming effect on the brain and nervous system, promoting sleep. It is commonly used in the treatment of insomnia, but has other uses that it may not be as effective in. It is possible that it may take up to one month to see any effects, but patients should be told that it is recommended for short-term use. Side effects of valerian include “headache, excitability, uneasiness, and even insomnia,” as well as, sluggishness. Dosages should correlate to the length of administration, those taking this herb on a long-term basis should consume approximately 120 mg (combined with 80 mg of lemon balm extract) three times daily and for those taking it for up to 28 days, 400-900 mg should be consumed about 30 minutes to 2 hours before bedtime. Patients should be advised not to drive or operate heavy machinery, take with other medications that have sedating effects or with alcohol.

Roman chamomile is a plant that is consumed as a tea by those who have issues with sleep. It chemical components have sedating and muscle relaxant properties, that help to calm and promote sleep. Possible side effects include nausea and vomiting if consumed in large doses, therefore dosing should be adequately adjusted for the age, weight, and health of the patient. Instructions on packaging should be followed precisely and any questions or concerns should be directed to one’s healthcare provider prior to self-administration. Lastly, Roman chamomile should not be consumed by those patients that are pregnant or breastfeeding, as well as, by those with allergies to “ragweed, marigold, [and] daisies”. (RxList, 2009).

Kava, the root of a plant from the South Pacific, acts upon the brain and nervous system when consumed as a tea and can promote sleep; it’s common alternative usage has been for the treatment of anxiety. This herbal remedy is not recommended for usage due to its hepatotoxic effects, and should be specifically avoided by those that are pregnant or breastfeeding, have a liver disorder, a diagnosis of Parkinson’s disease, or have an upcoming surgery (up to two weeks). Dosages should be adjusted depending on the weight and height, age, and overall health of the patient. It is imperative to warn patients of the signs and symptoms of liver damage (jaundice, dark urine, and/or fatigue) and explain the need to visit with their healthcare provider if they begin to experience any. Lastly, patients should be cautioned not combine kava with other sedating and/or hepatotoxic medications, and to avoid driving or operating machinery after consuming. (RxList, 2009).

Over-the-counter (OTC) sleep aids (include 3 examples)

Nytol (diphenhydramine) is an over-the-counter antihistamine commonly used as a sleep aid. The FDA has approved it for usage in adults older than 12 years of age, and it acts upon the brain by blocking histamine, which in turn causes sedation. Its common side effects include drowsiness, dry mouth, and constipation. It can worsen symptoms of other diseases, especially in the older adult, such as glaucoma, asthma, and prostate gland enlargement. Older adults also have the potential to suffer from over sedation if combined with other sedative medications. It is important to warn not to consume with alcohol, and to avoid driving after administration. They should also be told that sucking on hard sugar-free candies and staying hydrated can help issues with dry mouth and constipation, and to be cognizant of the possibility of dependence if taken for long periods of time. (RxList, 2009)

According to the Mayo Clinic (2014), doxylamine succinate (Unisom SleepTabs) is another OTC sleep aid that is a sedating antihistamine whose side effects and nursing interventions are similar to that of diphenhydramine. Its common use is to promote sleep in users who have difficulty falling asleep or who have sleep disorders (Mayo Clinic, 2014).

According to RxList (2009), melatonin is a synthetic medicine (it is a natural hormone found in the body) used to regulate the sleep cycle in those that have difficulty with both falling and staying asleep. It is safe when used short-term and can be taken by mouth or applies topically. Common side effects include headaches, daytime sleepiness, and dizziness. It is not recommended for use in children due to the possibility of a hormonal imbalance. It should also not be used by those who are pregnant or breast feeding, suffering from depression, or have been diagnosed with cancer and/or diabetes. If patients are currently taking sedating medications, immunosuppressant’s, anticoagulants, and birth control use of melatonin should be avoided. A typical dose of 0.3-0.5 mg should be taken at bedtime. It is important to caution patients taking melatonin not to drive or operate machinery after administration. Older adults should be told to take safety precautions to avoid falls. (Rx List, 2009).

Prescription medications (include 3 examples)

According to Aschenbrenner and Venable (2012), triazolam (Halcion) is a benzodiazepine that is used to promote sleep by decreasing the number of times a person awakens, specifically by lengthening sleep in Stage 2 of the sleep-wake cycle, shortening stages 3 and 4, and decreasing the amount of REM sleep (p. 232). Of the five benzodiazepines that have been approved for use as hypnotics, triazolam has the shortest half-life (1.5-5.5 hours), causing less daytime sedation (Aschenbrenner & Venable, 2012, p.232). Nonetheless, clients taking triazolam should be cautioned that the shorter half-life can cause higher possibilities of “early-morning insomnia” (Aschenbrenner & Venable, 2012, p. 232). Furthermore, patients should be told that this medication is to be taken short-term, and that if taken for 3-4 weeks, REM rebound can occur upon discontinuation - discontinuation should not be abrupt due to the possibility of insomnia returning worse than previously diagnosed. Other adverse effects of triazolam are the possibility of anterograde amnesia and problems arising with “depression or other psychiatric disorders” (Aschenbrenner & Venable, 2012, p.233). Patients should be notified of the teratogenic effects if taken by pregnant women in their first trimester and the last weeks of pregnancy – it can cause CNS depression in the fetus. Lastly, older adults should be cautioned of the increased possibility of falls, problems related to mobility and the performance of ADLs – it is critical to monitor these patients for “daytime sedation and impaired motor coordination (Aschenbrenner & Venable, 2012, p. 233).

Zolpidem (Ambien) is a nonbenozodiazepine that shares some chemical properties with benzodiazepines such as selective interaction with the GABA-BZ receptor complex that comes in both sublingual form and as an oral spray, and should only be taken for a short time (no more than 7 to 10 days) (Aschenbrenner & Venable, 2012, p. 234). Rapid-acting, it should be taken immediately before bed – it’s action includes preserving “all of the sleep stages and has only minor effects on REM sleep” (Aschenbrenner & Venable, 2012, p. 234). As per Aschenbrenner and Venable (2012), adverse effects include “headache, prolonged drowsiness, and dizziness, and excessive CNS depression is likely if combined with “alcohol or other CNS-depressant drugs,” all of which older adults may be more susceptible to; therefore, dosages for the older adult patient should be half that of a younger one (6.25 mg instead of 12.5 mg) (p. 234). Patients should be cautioned of possible rebound occurrences and the possibility of withdrawal symptoms is administration is abruptly stopped, as well as, the avoidance of use during pregnancy, delivery, and breast-feeding (Aschenbrenner & Venable, 2012, p. 234).

Another nonbenzodiazepine hypnotic used to promote sleep is eszopiclone (Lunesta), which is relatively fast acting, prevents awakening during the night and leaves the patient feeling refreshed the next morning (Aschenbrenner & Venable, 2012, p. 233). Aschenbrenner and Venable (2012) have stated that eszopiclone acts upon the GABA receptor-benzodiazepine receptor complexes, and is approved for long-term use – it hasn’t been found to build tolerance, but withdrawal symptoms *are* possible (p.233). This medication should be taken right before bedtime with a light meal (heavy meals can delay absorption), and should be closely monitored in individuals suffering drug addiction. Older adults should receive half doses due to the likelihood of being metabolized slower in these individuals (Aschenbrenner & Venable, 2012, p. 233). Long-term use can cause adverse effects, such as “headache, prolonged drowsiness, and an unpleasant taste” (Aschenbrenner & Venable, 2012, p. 233).

References

Aschenbrenner, D., & Venable, S. (2012). *Drug therapy in nursing* (4th ed.). Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins.

Cao, H., Pan, X., Li, H., & Liu, J. (2009). Acupuncture for treatment of insomnia: a systematic review of randomized controlled trials. *Journal Of Alternative And Complementary Medicine (New York, N.Y.)*, *15*(11), 1171-1186. doi:10.1089/acm.2009.0041

Eliopoulos, C. (2014). *Gerontological nursing* (8th ed.). Philadelphia: Lippincott Williams & Wilkins.

Konecny, L. (2012). “*Meeting responses in the spiritual domain*”. [PowerPoint slides]. Retrieved March 23, 2015.

Mayo Clinic - Mayo Clinic. (n.d.). Retrieved March 29, 2015, from http://www.mayoclinic.org/

Munk, N., Kruger, T., & Zanjani, F. (2011). Massage Therapy Usage and Reported Health in Older Adults Experiencing Persistent Pain. *Journal Of Alternative & Complementary Medicine*, *17*(7), 609-616. doi:10.1089/acm.2010.0151

Munk, N., & Zanjani, F. (2011). Relationship between massage therapy usage and health outcomes in older adults. *Journal Of Bodywork And Movement Therapies*, *15*(2), 177-185. doi:10.1016/j.jbmt.2010.01.007

RxList - The Internet Drug Index for prescription drugs, medications and pill identifier. (n.d.). Retrieved March 29, 2015, from http://www.rxlist.com/script/main/hp.asp

Shizheng, D., Jianshu, D., Heng, Z., Shengji, J., Guihua, X., Zengxia, L., & ... Zhiling, S. (2015). Taichi exercise for self-rated sleep quality in older people: A systematic review and meta-analysis. *International Journal Of Nursing Studies*, *52*(1), 368-379. doi:10.1016/j.ijnurstu.2014.05.009

Zuppa, C., Prado, C. H., Wieck, A., Zaparte, A., Barbosa, A., & Bauer, M. E. (2015). Acupuncture for sleep quality, BDNF levels and immunosenescence: A randomized controlled study. *Neuroscience Letters*, *587*35-40. doi:10.1016/j.neulet.2014.12.016