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# Integrative Health Services in School Health Clinics

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**Abstract:** *Objective:* Mental health treatment today incorporates neurobiology, genetics, neuro-imaging, and pharmacologic mechanisms, offering more options to patients. For some, these modern approaches are not viable choices due to reasons such as limited access to care, cost, intolerable side effects, and, in the pediatric population, fears of potential long-term effects. With the growing prevalence of chronic health conditions, concerns for age of onset, (McGorry, Purcell, Goldstone, & Amminger, 2011) and a growing population of mental health patients, cost-effective and evidence-based treatment options should be evaluated. Integrative treatments, also known as complementary and alternative medicine (CAM), may offer interventions that meet today's clinical needs.

*Method:* To evaluate evidence-based treatment options, we initiated the school-based integrative health program (IHP) in January 2011 at three high schools located in Massachusetts. Our goal was two-fold: first, to design a holistic treatment program and evaluate several integrative modalities, and; second, to determine the feasibility of providing a CAM health program through school clinics. Our protocol utilized three integrative treatments that addressed stress and anxiety conditions. Anxiety disorders are the most common mental illness affecting over 40 million adults in the US (Anxiety and Depression Association of America).

*Results:* The program has been successfully implemented. Preliminary results indicate that this intervention decreased anxiety in these youth.

*Conclusion:* Providing integrative techniques to students in the school setting has the potential to decrease barriers to accessing care, lowering treatment costs and decreasing school absenteeism by instituting care on-site. Offering a holistic approach to treatment in schools is feasible. Because utilizing these approaches involves their active participation, adolescents can acquire life-long skills that improve their ability to cope and confront inevitable life stressors.

**Keywords:** Complementary alternative medicine (CAM), integrative medicine, pediatric medicine, adolescent stress and anxiety.

## INTRODUCTION

Integrative medicine recognizes the importance of using natural, effective, minimally-invasive interventions whenever possible, especially in the pediatric population where concerns of potential long-term effects are paramount. Delivering health services in schools has many advantages, and school-based health centers are well-established in many communities (see <http://www.hrsa.gov/ourstories/schoolhealthcenters/>). These centers provide many services, but most focus mainly on traditional medical care. This article describes a multi-site school-based integrative health program (IHP) implemented in Boston area public high schools, the first program of its kind in the US.

## COMPLEMENTARY AND ALTERNATIVE MEDICINE (CAM)

Complementary medicine refers to the use of a non-conventional approach to treatment partnered with

conventional medicine. CAM treatments have been implemented for hundreds of years and, in some cases, millennia. Alternative treatment modalities such as acupuncture and aromatherapy have been used since the third millennium BC. Other more modern interpretations of CAM, such as lifestyle interventions, (Nuwaha & Musinguzi, 2013) are able to provide considerable relief to patients; however, until recently, holistic therapies were not considered appropriate treatment choices due to a paucity of research to support their use. But, more recent medical literature includes a growing body of evidence that validates the efficacy and safety profile of numerous integrative therapies and the popularity of CAM continues to grow.

## INTEGRATIVE MEDICINE

Integrative medicine “combines mainstream medical therapies and CAM therapies for which there is some high-quality scientific evidence of safety and effectiveness” (definition from the National Institute of Health; see <http://www.nlm.nih.gov/tsd/acquisitions/cdm/subjects24.html>). A growing body of research studies indicates that integrative medicine offers practical and feasible approaches that can be easily incorporated into pre-existing treatment plans or used as stand-alone techniques. Integrative medicine,

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which takes into account the entire person—body, mind, and spirit, as well as individual lifestyle, underscores the therapeutic relationship and makes use of both conventional and alternative therapies.

The U.S. Department of Health and Human Services, National Center for Complementary and Alternative Medicine (NCCAM) at the National Institutes of Health (NIH) reported in 2007 that 40% of Americans use non-conventional approaches to achieve well-being. CAM approaches are considered to be a part of integrative medicine, which is becoming more prevalent. Many health care providers and systems are beginning to integrate various practices of non-conventional medicine like massage therapy and acupuncture into treatment and health promotion. The driving factors of this increase appear to come from consumers who perceive benefits to their health or well-being.

Since 2007, the NCCAM has developed the *Third Strategic Plan for 2011-2015, Exploring the Science of Complementary and Alternative Medicine*, (National Center for Complementary and Alternative Medicine, 2011) which emphasizes the importance of basic and clinical research to building evidence for CAM. This report further emphasizes the importance of translational research and bringing the methods of effectiveness and outcomes research to the real world. A strategic objective of the plan focuses on the benefits, risks, and cost-effectiveness of CAM use in the general public. One of the strategies will be to study the safety of adult and pediatric CAM.

## SCHOOL-BASED INTEGRATIVE HEALTH PROGRAM

### Background and Goals

The Integrative Health Program (IHP), launched in 2011, utilizes a multi-disciplinary approach to provide integrative services to high school students in a school-based clinical setting. The IHP implements mind and/or body techniques, sound therapy, aromatherapy, and acupuncture to address anxiety and stress-related disorders.

The initial goals of the IHP were: 1) to design a holistic treatment program and evaluate several integrative modalities, and; 2) to determine the feasibility of a complementary and alternative health program in a school clinic. We sought and received IRB approval from Massachusetts General Hospital for evaluating the efficacy of the program, and engaged in administrative negotiation with Chelsea High School, Chelsea, Massachusetts in December 2010 and January 2011. Subsequently, interest in the program grew and we expanded clinical sites into Revere High School located in Revere, Massachusetts and Rindge and Latin High School in Cambridge, Massachusetts. The Revere and Cambridge sites joined the program in February 2012 and September 2012, respectively (*Helping Students Learn to Manage Anxiety* 2013).

### Description of the Program

The program utilizes three integrative treatments, all of which address stress and anxiety conditions by providing treatment, education, and self-help skills to its adolescent participants. While there are many integrative therapies, we

focused on three: medical acupuncture, the use of clinical-grade aromatherapy essential oils, and sound therapy.

We determined our focus to be stress and/or anxiety conditions within an adolescent population. Anxiety disorders are the most prevalent mental illness and 25 percent of 13 to 18 year olds are estimated to suffer from an anxiety disorder at any given time. (Kessler, Chiu, Demler, & Walters, 2005). Furthermore, 75% of persons suffering from anxiety disorder experience their first episode around 21.5 years of age (Kessler, Berglund, Demler, Jin, & Walters, 2005).

The initial IHP program at Chelsea High School was a 10-week treatment course, which included two informational workshop sessions that provided an introduction to integrative treatments, and eight weekly, 30-minute appointments that included aromatherapy for relaxation, targeted acupuncture points, and sound therapy. The acupuncture points are supported by research data of known point locations that impact anxiety and stress symptoms. Although traditional allopathic medical interventions were available if needed, none of the students involved in this group required acute medical treatment and all participants completed the 10-week program. Further, there were no reported or observed side effects or adverse reactions.

### Participants

For inclusion in the IHP program, students were referred from several sources: teachers, parents, counselors, mental health providers, and school nurses. After referral, students were evaluated by clinicians in the student health clinic to ensure they met Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria for an anxiety or stress condition. Although most students in the program were not taking any psychiatric medication, a number were in outpatient treatment and on medication. This was not an exclusion criteria. The protocol required that those taking psychiatric medication could continue to do so but not partake in dose changes during the course of the IHP program. Exclusion criteria included pregnancy, psychosis, and substance abuse.

Participants under the age of 18 required parental consent; however, students 18 and older could provide their own consent. In either case, student participants received informational sessions, handouts, and met with health care providers at the clinic to receive a full description of the IHP program, insuring students made an informed decision.

The student participants were placed on a list and randomly chosen to enter the IHP program. Those who were not in the treatment group were offered other outpatient services and some chose no treatment.

Participants engaged in the IHP program during normal school hours. Each 30-minute treatment session allowed students to excuse themselves from class but return during the course of the same subject or lesson, as compared to leaving school for an appointment at the hospital. This program design was most conducive to ensure minimal disruption of the school day for participants, allow easier access to care, and alleviate transportation concerns. The program design also promotes school attendance, decreasing absenteeism for off-site clinical appointments; this was well-received by both parents and the school system.

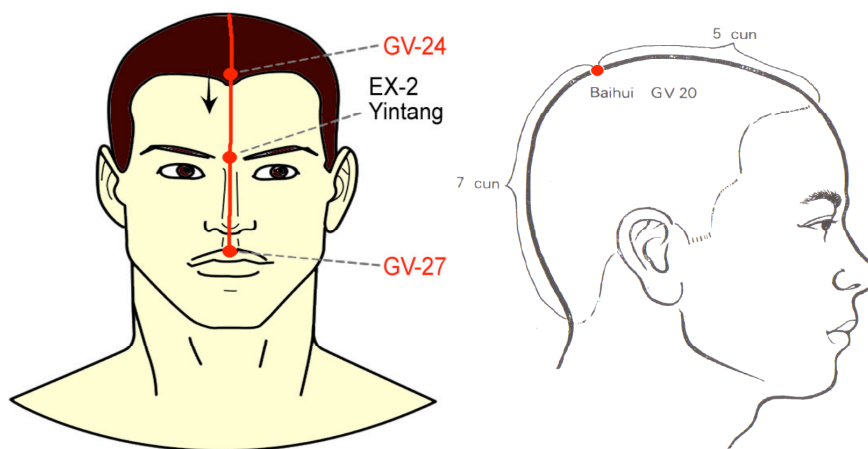
## Therapies Utilized

The IHP program consisted of two informational presentations and eight, 30-minute, weekly sessions that included acupuncture; sound therapy with tuning forks, and aromatherapy with essential oils, which are the highly concentrated, volatile extracts of herbs, flowers, and plants. Students also learned about pressure points and other techniques to manage mood and modulate their anxiety and stress levels.

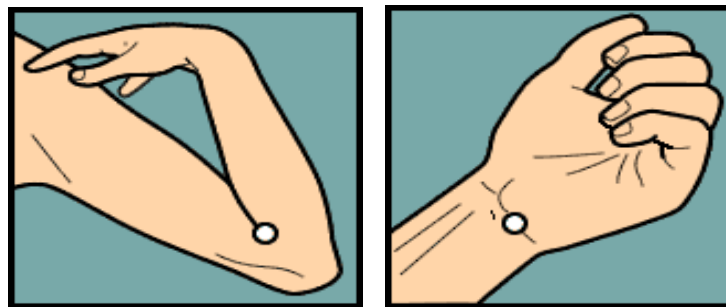
**Medical acupuncture.** For the purposes of the IHP protocol the same acupuncture points were used for each subject at every treatment session. The points were selected as locations, according to Traditional Chinese Medicine (TCM) practice, commonly used and associated with decreased anxiety and stress (Aung & Chen, 2007) All acupuncture

points used in the IHP were located either on the head/facial area, lower arms, or lower legs. For this reason, participants were able to remain fully clothed for the session. In order to access the acupuncture points, students exposed the lower arm and leg areas by rolling up sleeves and pant legs. These points include: head and facial region - GV20, Yintang Fig. (1); lower arm - LI 11, HT 7 Fig. (2); ST 36, Sp 6, and LV3 Fig. (3). Once inserted, the needles remained in place for fifteen minutes prior to removal.

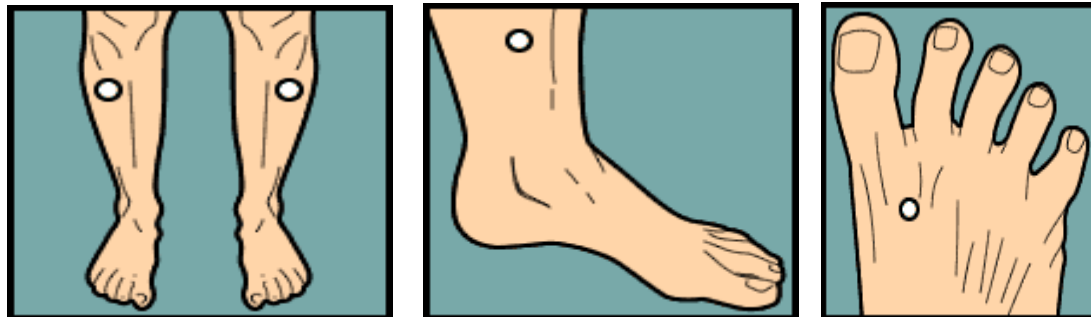
**Aromatherapy.** Lavender and grapefruit essential oils (EOs) were used in the IHP at the beginning and the end of the session. The IHP implemented Lavender (*Lavandula angustifolia*) EO utilizing the inhalation method. The EO was aromatized near the participant's nasal passages for several minutes while they inhaled and exhaled normally. This EO was used at the initiation of the treatment prior to acu-



**Fig. (1).** Head acupuncture points Yintang and GV 20. From "Gross Anatomy and acupuncture: A comparative approach to reappraise the meridian system," by S. Marcelli, 2015, retrieved from <www.geneticacupuncture.com>. Reprinted with permission.



**Fig. (2).** LI 11 and HT 7; From "Point Finder" by K. Boyd, 2002, Retrieved from <www.pointfinder.org>. Reprinted with permission.



**Fig. (3).** (Top left and clockwise) ST 36, SP 6; LV 3; From "Point Finder" by K. Boyd, 2002, Retrieved from <www.pointfinder.org>. Reprinted with permission.

puncture. At the end of the session, the final step was the inhalation of grapefruit (*Citrus Paradisi*) EO.

**Sound Therapy.** Tuning forks were used for sound therapy. Tuning forks are steel tines in a U-shaped form that act as acoustic resonators. Once activated, which requires firmly tapping the instrument on a rubber mallet base, they produce a specific and constant musical pitch that endures for several minutes. Figure (4) depicts examples.



**Fig. (4).** Tuning forks. From “Ohm Therapeutics” by Sound Universe, 2015. Retrieved from [www.soundhealingtools.com](http://www.soundhealingtools.com)> Reprinted with permission.

The particular tuning forks used for the IHP were set to emit a pure musical tone at a frequency of 136.1 Hz. There are hundreds of tuning forks of various lengths and masses, each which produce different, precise sound frequencies. Often they are used to tune musical instruments and frequently applied in Indian temple music. The IHP chose the 136.1 Hz frequency due to its deeply resonant sound and long-term application in integrative treatments used to reduce stress, relieve body tension, and assist in meditative practices.

For the IHP session, the tuning forks were activated and held bilaterally and simultaneously approximately three to five inches from each ear for several minutes. As the sound and vibration ceased the tuning forks were re-activated and held in the same position for a total duration of approximately five minutes. This is illustrated in the following Fig. (5).

#### The Use of Structured Assessment Tools to Evaluate the Program

The Beck Anxiety Inventory (BAI) and an integrative medicine outcome measure, The Web of Wellness (WoW), were administered pre- and post-intervention. The BAI was developed to discriminate between anxiety and depression and measures clinical anxiety using a 21-item self-report scale that takes only 5 to 10 minutes to complete (Beck, Epstein, Brown, & Steer, 1988).

The WoW is a self-report tool used in integrative and holistic medicine. The WoW assists with establishing a baseline and monitoring changes in overall health and well-being post treatment. As Fig. (6) depicts, this report tool evaluates



**Fig. (5).** Tuning forks in bilateral ear position. From “Ohm Therapeutics” by Sound Universe, 2015. Retrieved from [www.soundhealingtools.com](http://www.soundhealingtools.com)> Reprinted with permission.

eight interconnected aspects or parameters of life that affect health and wellness (i.e. mental, physical, financial, spiritual, family, relationships, career, and social). The WoW is a thought-provoking exercise that provides a strong visual aid to enforce the importance of a complete and balanced wellness model.

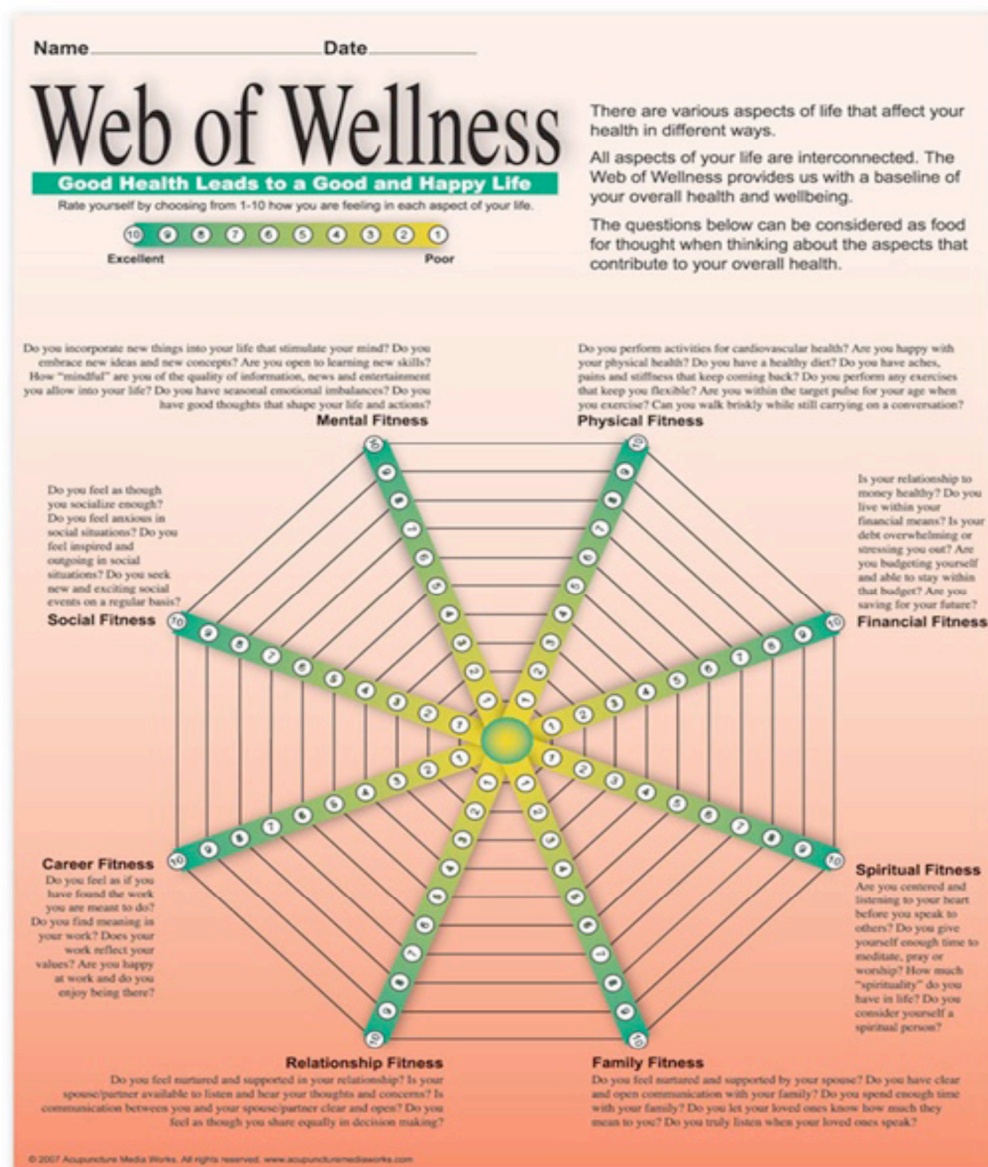
#### RESULTS

To date over 100 students have completed the 10-week IHP program and treatments. All students who participated in the program reported moderate to significant reduction in anxiety symptoms. Preliminary results as measured by the pre- and post-outcome measures described have shown significant reductions in symptoms of anxiety and stress. Scores on the BAI decreased and scores on the WoW increased following program completion. On average, symptoms were reduced by one-third and wellness increased. The treatments have been very well-tolerated and there have been no observed or reported adverse reactions or side effects among all cohorts.

We are optimistic that the program can expand throughout the state of Massachusetts where there are 41 school-based health centers where this program can be replicated.

#### DISCUSSION

Anxiety disorders, the most common mental illness in the U.S., are widespread and costly to society (Kessler & Greenberg, 2002) According to the most recent figures, anxiety disorders cost the U.S. more than \$42 billion a year, almost one-third of the country's \$148 billion total mental health bill (Anxiety and Depression Association of America Facts & Statistics; <http://www.adaa.org/about-adaa/press-room/facts-statistics>). The adolescent years are the core risk phase for the development of anxiety symptoms and syndromes, ranging from transient, mild symptoms to severe anxiety disorders. A national survey of adolescent mental health reported that of the 18 percent of the U.S. population that is affected by this disorder, 8 percent are teens ages 13 to 18. Of these teens, only 18% receive mental health care (National Institute of Mental Health, n. d.).



**Fig. (6).** The Web of Wellness. From "Acupuncture Media Works" <www.acupuncturemediaworks.com>. Reprinted with permission.

For many teenagers, anxiety is part of adolescence, a stage of life rife with challenges. The physical and psychological changes that adolescents experience are a great deal to handle, particularly when coupled with mounting academic demands and familial pressures. Difficulty in school, trouble meeting and making new friends, and keeping up with fashion and trends, all can further contribute to stress and anxiety. Not having the resources to join in interests with others, the inability to participate in sports or other activities because an after school job is necessary can also be a contributing factor.

The students participating in the IHP program bear their share of anxiety and stress, but using the tools and techniques that we taught them, they developed newfound confidence and health. This is no mean feat in communities like Chelsea and Revere where other pressures can exacerbate emotional problems. Median household income in Chelsea, for example, is two thirds of the state average, with 27 per-

cent of children living below the poverty line compared with the state average of 12.8 percent.

The objective of the IHP program is to empower high-school students to take an active role in their treatment and long-term health. With this experience, adolescents gain a deeper appreciation of their own physiology and become more cognoscente of their body's ability to heal itself and maintain homeostasis. The adolescents who participate in the program develop an understanding of preventive health treatments and assume increased personal responsibility for their overall health and well-being. This shift from an external focus of control, (e.g. a medical professional administering a pill) to an internal focus of control that is patient centered can increase awareness and self-esteem, while decreasing anxiety.

We chose the three modalities we used because they have a good evidence base for efficacy in anxiety and it is feasible to administer them in a school clinic.

## ACUPUNCTURE

Traditional Chinese medicine (TCM) includes acupuncture, which works on the principle of stimulating points in the body to correct imbalances in the flow of energy (Qi) through channels known as meridians (Ljubinovic, 2013). Acupuncture is a safe CAM modality for pediatric patients (Jindal, Ge, & Mansky, 2008).

Western medicine has made numerous attempts to explain acupuncture's mechanism of action from an allopathic perspective. While it has yet to be fully elucidated, there are certain aspects that have gained general acceptance. First, many of the over 350 acupuncture points correspond to nerve bundles or muscle trigger points. Neuroimaging studies show that acupuncture can calm areas of the brain that register pain and activate those involved in down regulating the stress response (Dhond, Kettner, & Napadow, 2007). Doppler ultrasound has shown that acupuncture increases blood flow in treated areas (Lo, Lin, Wei, & Sun, 2013). Finally, thermal imaging shows that acupuncture can decrease inflammation (Santos *et al.*, 2013; Stux, Berman, & Pomeranz, 2000).

Errington-Evans conducted an extensive literature review to evaluate the role of acupuncture in anxiety conditions (2012). Results showed statistically significant effects directly attributable to acupuncture treatment. It should be noted that the author discussed the need for improved study design, which lends influence and support to the use of acupuncture to significantly reduce the symptoms of anxiety disorders.

## AROMATHERAPY

Aromatherapy is a holistic medicine which uses the volatile oils of aromatic plants for therapeutic applications. It is concerned with the psychological, physiological and pharmacological effects of essential oils (EO). Aromatherapy can be introduced by means of inhalation, through the olfactory system, and dermal application whereby the EO is absorbed through the skin and travels through the tissue to enter the circulation (van der Watt, Laugharne, & Janca, 2008).

The effects of aromatherapy are theorized to result from the binding of chemical components in the EO to olfactory bulb receptors in the limbic system (Buchbauer, Jirovetz, Jäger 1993). Current research has also focused on topical application of EO and found that it may exert antibacterial, anti-inflammatory, and analgesic effects (Herro E, Jacob, 2010; Stea, Beraudi, & De Pasquale, 2014).

Lavender, like all essential oils, it is not a pure compound. It is a complex mixture of naturally occurring phytochemicals, including linalool and linalyl acetate. The scent has a calming effect that may aid in anxiety and stress reduction as well as overall relaxation (Hongratanaworakit, 2011; Shiina *et al.*, 2008). Further, it has been shown to reduce agitation and have sleep-promoting properties (Lewith, Godfrey, & Prescott, 2005; Lin, Chan, Ng, & Lam, 2007).

One of the major components of Lavender EO is linalool, which has been demonstrated to act postsynaptically. The possible mechanism is via the modulation of cyclic adenosine monophosphate (cAMP) activity (Lis-Balchin & Hart

1999). Linalool has been found to inhibit the GABA<sub>A</sub> binding receptor in the central nervous system of animal models and induce a relaxed state (Brum, Elisabetsky, & Souza 2001).

The grapefruit is the largest of the citrus fruits and a natural hybrid of the pummelo and sweet orange. The main chemical constituents are monoterpene hydrocarbons (limonene and myrcene), sesquiterpenes, alcohols, aldehydes, esters, and flavonoid glycosides (Feger, 2006). These constituents work in concert and have shown various applications as olfactory stimulants. They have antibacterial properties, and apoptotic activity specific to human leukemia cells (Abulrob, Suller, Gumbleton, Simons, & Russell, 2004; Hata *et al.*, 2003; Tanida *et al.*, 2008).

## SOUND THERAPY

Sound therapy has been used for centuries by many cultural, religious, and indigenous groups around the globe including, ancient Greek and Egyptian civilizations, Vedic Indian culture, Tibetan traditions, Aboriginal groups in Australia, and the American native Navajo tribes (Antrim, 2006; Cook, 1997; Gaynor, 2002).

The broad category of sound therapy includes music therapy. Fundamentally, music is organized sound and is a form of treatment well-known in allopathic medicine. Since the National Association of Music in Hospitals was created in 1926, many hospitals and clinics throughout the US have developed music therapy programs to support patient recovery (Edwards, 2008).

Early music therapy programs grew slowly, but rapid growth ensued following WWII. Soldiers returned home from the battlefields with emotional and psychological problems and music and soothing sounds provided relief and played a supportive role in their healing. In 1945, the U.S. War Department issued Technical Bulletin 187, which detailed a music therapy program created by the Office of the Surgeon General (American Music Therapy Association, 2014). It was considered supportive of occupational therapy and physical reconditioning.

The use of sound and music are non-invasive, simple and cost-effective therapeutic tools. This form of treatment has proven to reduce pain and anxiety for children undergoing medical or dental procedures. In addition, when music therapy is combined with other modalities it may be more effective than when implemented alone (Bekhuis, 2009). Sound and music have also been shown to reduce arousal during stress and support a state of calm (Pelletier, 2004). Further, a recent Cochrane review highlighted the physiologic effects of this modality and found that music may reduce the effects of coronary artery disease and decrease blood pressure, heart rate, and respiratory rate (Bradt & Dileo, 2009).

American adolescents listen to approximately 4.5 hours of music per day. The use of sound and music are processes with which they are familiar and easy to adopt (Campbell, Connell, & Beegle, 2007). In this population, music therapy has been shown to improve adolescent mood by reducing stress and lowering anxiety levels, which can help counteract or prevent depression (Misic, Arandjelovic, Stanojkovic, Vladejic, & Mladenovic, 2010).

## CONCLUSIONS

The IHP served as a model to evaluate the feasibility and efficacy of an integrative treatment program in a school-based clinical setting. The success of this program highlights the interest, need, and workability of integrative health services in school clinics. The IHP program ushers in a new paradigm for a school-based patient-centered service that involves the use of integrative modalities like acupuncture, sound therapy, and aromatherapy. These modalities are used to educate and help treat anxiety and stress-related disorders in adolescents. The IHP program offers many benefits to student participants including empowerment, education in self-care techniques, and personal responsibility for one's own health. It has the potential to foster resiliency that prepares individuals for coping with life's inevitable stressors. The overall benefits of the IHP program are decreased barriers to access to care, decreased school absenteeism for treatment appointments, cost-effectiveness, introduction to a holistic approach to treatment, and promotion of long-term preventive health care.

Even those new to integrative therapies can implement these services with relative ease. Other than medical acupuncture, clinical aromatherapy and sound therapy can be utilized with minimal training and a basic review of techniques. In lieu of acupuncture, acupressure points, which include the same point locations but stimulation of the area with manual finger pressure rather than needles can be used. These services are easy to implement, minimally to non-invasive, and cost-effective. Evidence supporting their efficacy continues to expand as well as a number of other alternative and complementary treatments. This holistic approach to patient care offers not only symptom relief but an educational component as they acquire new skills to enhance preventive health and self-care techniques.

Our hope is for similar programs to be offered in school health clinics. In addition to the three sites where the IHP was conducted, there are several other schools in Massachusetts that have met with us and are in the planning phase of initiating integrative health services in their schools. We hope to facilitate similar programs and support efforts to offer CAM therapies to the vulnerable adolescent population.

## ABOUT THE AUTHOR

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## CONFLICT OF INTEREST

Dr. Milosavljevic reports no biomedical or financial conflicts of interest.

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which takes into account the entire person—body, mind, and spirit, as well as individual lifestyle, underscores the therapeutic relationship and makes use of both conventional and alternative therapies.

The U.S. Department of Health and Human Services, National Center for Complementary and Alternative Medicine (NCCAM) at the National Institutes of Health (NIH) reported in 2007 that 40% of Americans use non-conventional approaches to achieve well-being. CAM approaches are considered to be a part of integrative medicine, which is becoming more prevalent. Many health care providers and systems are beginning to integrate various practices of non-conventional medicine like massage therapy and acupuncture into treatment and health promotion. The driving factors of this increase appear to come from consumers who perceive benefits to their health or well-being.

Since 2007, the NCCAM has developed the *Third Strategic Plan for 2011-2015, Exploring the Science of Complementary and Alternative Medicine*, (National Center for Complementary and Alternative Medicine, 2011) which emphasizes the importance of basic and clinical research to building evidence for CAM. This report further emphasizes the importance of translational research and bringing the methods of effectiveness and outcomes research to the real world. A strategic objective of the plan focuses on the benefits, risks, and cost-effectiveness of CAM use in the general public. One of the strategies will be to study the safety of adult and pediatric CAM.

## SCHOOL-BASED INTEGRATIVE HEALTH PROGRAM

### Background and Goals

The Integrative Health Program (IHP), launched in 2011, utilizes a multi-disciplinary approach to provide integrative services to high school students in a school-based clinical setting. The IHP implements mind and/or body techniques, sound therapy, aromatherapy, and acupuncture to address anxiety and stress-related disorders.

The initial goals of the IHP were: 1) to design a holistic treatment program and evaluate several integrative modalities, and; 2) to determine the feasibility of a complementary and alternative health program in a school clinic. We sought and received IRB approval from Massachusetts General Hospital for evaluating the efficacy of the program, and engaged in administrative negotiation with Chelsea High School, Chelsea, Massachusetts in December 2010 and January 2011. Subsequently, interest in the program grew and we expanded clinical sites into Revere High School located in Revere, Massachusetts and Rindge and Latin High School in Cambridge, Massachusetts. The Revere and Cambridge sites joined the program in February 2012 and September 2012, respectively (*Helping Students Learn to Manage Anxiety* 2013).

### Description of the Program

The program utilizes three integrative treatments, all of which address stress and anxiety conditions by providing treatment, education, and self-help skills to its adolescent participants. While there are many integrative therapies, we

focused on three: medical acupuncture, the use of clinical-grade aromatherapy essential oils, and sound therapy.

We determined our focus to be stress and/or anxiety conditions within an adolescent population. Anxiety disorders are the most prevalent mental illness and 25 percent of 13 to 18 year olds are estimated to suffer from an anxiety disorder at any given time. (Kessler, Chiu, Demler, & Walters, 2005). Furthermore, 75% of persons suffering from anxiety disorder experience their first episode around 21.5 years of age (Kessler, Berglund, Demler, Jin, & Walters, 2005).

The initial IHP program at Chelsea High School was a 10-week treatment course, which included two informational workshop sessions that provided an introduction to integrative treatments, and eight weekly, 30-minute appointments that included aromatherapy for relaxation, targeted acupuncture points, and sound therapy. The acupuncture points are supported by research data of known point locations that impact anxiety and stress symptoms. Although traditional allopathic medical interventions were available if needed, none of the students involved in this group required acute medical treatment and all participants completed the 10-week program. Further, there were no reported or observed side effects or adverse reactions.

### Participants

For inclusion in the IHP program, students were referred from several sources: teachers, parents, counselors, mental health providers, and school nurses. After referral, students were evaluated by clinicians in the student health clinic to ensure they met Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria for an anxiety or stress condition. Although most students in the program were not taking any psychiatric medication, a number were in outpatient treatment and on medication. This was not an exclusion criteria. The protocol required that those taking psychiatric medication could continue to do so but not partake in dose changes during the course of the IHP program. Exclusion criteria included pregnancy, psychosis, and substance abuse.

Participants under the age of 18 required parental consent; however, students 18 and older could provide their own consent. In either case, student participants received informational sessions, handouts, and met with health care providers at the clinic to receive a full description of the IHP program, insuring students made an informed decision.

The student participants were placed on a list and randomly chosen to enter the IHP program. Those who were not in the treatment group were offered other outpatient services and some chose no treatment.

Participants engaged in the IHP program during normal school hours. Each 30-minute treatment session allowed students to excuse themselves from class but return during the course of the same subject or lesson, as compared to leaving school for an appointment at the hospital. This program design was most conducive to ensure minimal disruption of the school day for participants, allow easier access to care, and alleviate transportation concerns. The program design also promotes school attendance, decreasing absenteeism for off-site clinical appointments; this was well-received by both parents and the school system.

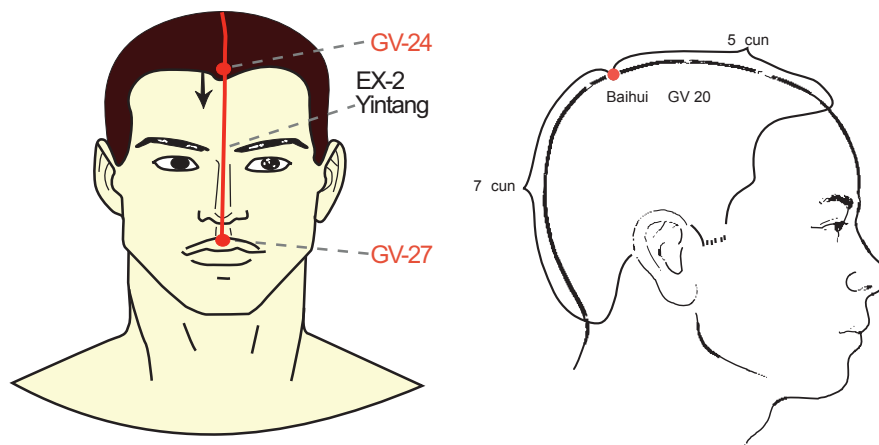
## Therapies Utilized

The IHP program consisted of two informational presentations and eight, 30-minute, weekly sessions that included acupuncture; sound therapy with tuning forks, and aromatherapy with essential oils, which are the highly concentrated, volatile extracts of herbs, flowers, and plants. Students also learned about pressure points and other techniques to manage mood and modulate their anxiety and stress levels.

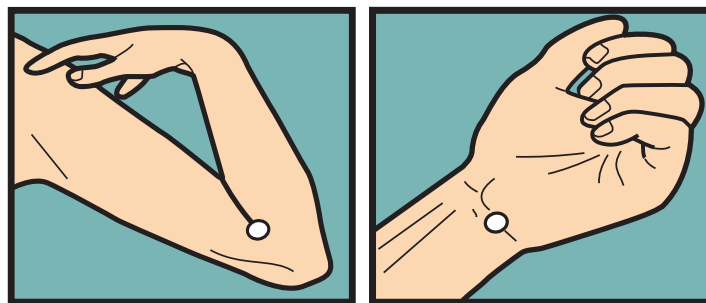
**Medical acupuncture.** For the purposes of the IHP protocol the same acupuncture points were used for each subject at every treatment session. The points were selected as locations, according to Traditional Chinese Medicine (TCM) practice, commonly used and associated with decreased anxiety and stress (Aung & Chen, 2007) All acupuncture

points used in the IHP were located either on the head/facial area, lower arms, or lower legs. For this reason, participants were able to remain fully clothed for the session. In order to access the acupuncture points, students exposed the lower arm and leg areas by rolling up sleeves and pant legs. These points include: head and facial region - GV20, Yintang Fig. (1); lower arm - LI 11, HT 7 Fig. (2); ST 36, Sp 6, and LV3 Fig. (3). Once inserted, the needles remained in place for fifteen minutes prior to removal.

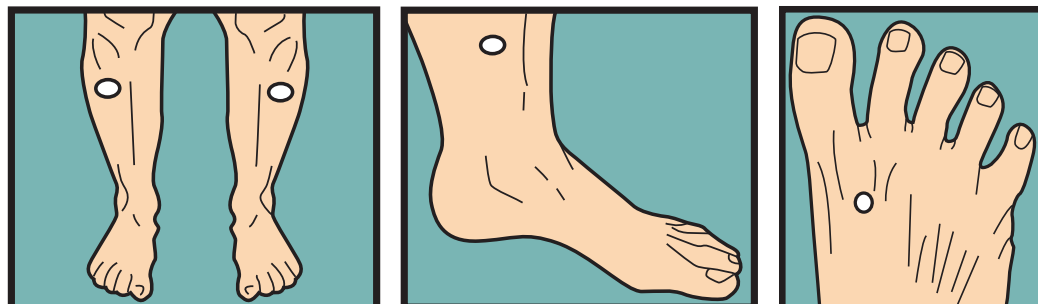
**Aromatherapy.** Lavender and grapefruit essential oils (EOs) were used in the IHP at the beginning and the end of the session. The IHP implemented Lavender (*Lavandula angustifolia*) EO utilizing the inhalation method. The EO was aromatized near the participant's nasal passages for several minutes while they inhaled and exhaled normally. This EO was used at the initiation of the treatment prior to acu-



**Fig. (1).** Head acupuncture points Yintang and GV 20. From "Gross Anatomy and acupuncture: A comparative approach to reappraise the meridian system," by S. Marcelli, 2015, retrieved from <www.geneticacupuncture.com>. Reprinted with permission.



**Fig. (2).** LI 11 and HT 7; From "Point Finder" by K. Boyd, 2002, Retrieved from <www.pointfinder.org>. Reprinted with permission.



**Fig. (3).** (Top left and clockwise) ST 36, SP 6; LV 3; From "Point Finder" by K. Boyd, 2002, Retrieved from <www.pointfinder.org>. Reprinted with permission.

puncture. At the end of the session, the final step was the inhalation of grapefruit (*Citrus Paradisi*) EO.

**Sound Therapy.** Tuning forks were used for sound therapy. Tuning forks are steel tines in a U-shaped form that act as acoustic resonators. Once activated, which requires firmly tapping the instrument on a rubber mallet base, they produce a specific and constant musical pitch that endures for several minutes. Figure (4) depicts examples.



**Fig. (4).** Tuning forks. From “Ohm Therapeutics” by Sound Universe, 2015. Retrieved from [www.soundhealingtools.com](http://www.soundhealingtools.com)> Reprinted with permission.

The particular tuning forks used for the IHP were set to emit a pure musical tone at a frequency of 136.1 Hz. There are hundreds of tuning forks of various lengths and masses, each which produce different, precise sound frequencies. Often they are used to tune musical instruments and frequently applied in Indian temple music. The IHP chose the 136.1 Hz frequency due to its deeply resonant sound and long-term application in integrative treatments used to reduce stress, relieve body tension, and assist in meditative practices.

For the IHP session, the tuning forks were activated and held bilaterally and simultaneously approximately three to five inches from each ear for several minutes. As the sound and vibration ceased the tuning forks were re-activated and held in the same position for a total duration of approximately five minutes. This is illustrated in the following Fig. (5).

#### The Use of Structured Assessment Tools to Evaluate the Program

The Beck Anxiety Inventory (BAI) and an integrative medicine outcome measure, The Web of Wellness (WoW), were administered pre- and post-intervention. The BAI was developed to discriminate between anxiety and depression and measures clinical anxiety using a 21-item self-report scale that takes only 5 to 10 minutes to complete (Beck, Epstein, Brown, & Steer, 1988).

The WoW is a self-report tool used in integrative and holistic medicine. The WoW assists with establishing a baseline and monitoring changes in overall health and well-being post treatment. As Fig. (6) depicts, this report tool evaluates



**Fig. (5).** Tuning forks in bilateral ear position. From “Ohm Therapeutics” by Sound Universe, 2015. Retrieved from [www.soundhealingtools.com](http://www.soundhealingtools.com)> Reprinted with permission.

eight interconnected aspects or parameters of life that affect health and wellness (i.e. mental, physical, financial, spiritual, family, relationships, career, and social). The WoW is a thought-provoking exercise that provides a strong visual aid to enforce the importance of a complete and balanced wellness model.

## RESULTS

To date over 100 students have completed the 10-week IHP program and treatments. All students who participated in the program reported moderate to significant reduction in anxiety symptoms. Preliminary results as measured by the pre- and post-outcome measures described have shown significant reductions in symptoms of anxiety and stress. Scores on the BAI decreased and scores on the WoW increased following program completion. On average, symptoms were reduced by one-third and wellness increased. The treatments have been very well-tolerated and there have been no observed or reported adverse reactions or side effects among all cohorts.

We are optimistic that the program can expand throughout the state of Massachusetts where there are 41 school-based health centers where this program can be replicated.

## DISCUSSION

Anxiety disorders, the most common mental illness in the U.S., are widespread and costly to society (Kessler & Greenberg, 2002). According to the most recent figures, anxiety disorders cost the U.S. more than \$42 billion a year, almost one-third of the country's \$148 billion total mental health bill (Anxiety and Depression Association of America Facts & Statistics; <http://www.adaa.org/about-adaa/press-room/facts-statistics>). The adolescent years are the core risk phase for the development of anxiety symptoms and syndromes, ranging from transient, mild symptoms to severe anxiety disorders. A national survey of adolescent mental health reported that of the 18 percent of the U.S. population that is affected by this disorder, 8 percent are teens ages 13 to 18. Of these teens, only 18% receive mental health care (National Institute of Mental Health, n. d.).

Name \_\_\_\_\_ Date \_\_\_\_\_

# Web of Wellness

**Good Health Leads to a Good and Happy Life**  
Rate yourself by choosing from 1-10 how you are feeling in each aspect or your life.

10 9 8 7 6 5 4 3 2 1  
Excellent Poor

There are various aspects of life that affect your health in different ways.

All aspects of your life are interconnected. The Web of Wellness provides us with a baseline of Your overall health and wellbeing.

The questions below can be considered as food for thought when thinking about the aspects that contribute to your overall health.

**Mental Fitness**  
Do you incorporate new things into your life that stimulate your mind? Do you embrace new ideas and new concepts? Are you open to learning new skills? How "mindful" are you of the quality of information, news and circumstances you allow into your life? Do you have seasonal emotional imbalances? Do you have good thoughts that shape your life and actions?

**Physical Fitness**  
Do you perform activities for cardiovascular health? Are you happy with your physical health? Do you have a healthy diet? Do you have aches, pains and stiffness that keep coming back? Do you perform any exercises that keep you flexible? Are you within the target pulse for your age when you exercise? Can you walk briskly while still carrying on a conversation?

**Social Fitness**  
Do you feel as though you socialize enough? Do you feel anxious in social situations? Do you feel inspired and outgoing in social situations? Do you seek new and exciting social events on a regular basis?

**Financial Fitness**  
Is your relationship to money healthy? Do you live within your financial means? Is your debt overwhelming or stressing you out? Are you budgeting yourself and able to stay within that budget? Are you saving for your future?

**Spiritual Fitness**  
Are you concerned and listening to your heart before you speak to others? Do you give yourself enough time to meditate, pray or worship? How much "spirituality" do you have in life? Do you consider yourself a spiritual person?

**Career Fitness**  
Do you feel as if you have found the work you are meant to do? Do you find meaning in your work? Does your work reflect your values? Are you happy at work and do you enjoy being there?

**Relationship Fitness**  
Do you feel nurtured and supported in your relationship? Is your spouse/partner available to listen and hear your thoughts and concerns? Is communication between you and your spouse/partner clear and open? Do you feel as though you share equality in decision making?

**Family Fitness**  
Do you feel nurtured and supported by your spouse? Do you have clear and open communication with your family? Do you spend enough time with your family? Do you let your loved ones know how much they mean to you? Do you truly listen when your loved ones speak?

**Fig. (6).** The Web of Wellness. From "Acupuncture Media Works" <[www.acupuncturemediaworks.com](http://www.acupuncturemediaworks.com)>. Reprinted with permission.

For many teenagers, anxiety is part of adolescence, a stage of life rife with challenges. The physical and psychological changes that adolescents experience are a great deal to handle, particularly when coupled with mounting academic demands and familial pressures. Difficulty in school, trouble meeting and making new friends, and keeping up with fashion and trends, all can further contribute to stress and anxiety. Not having the resources to join in interests with others, the inability to participate in sports or other activities because an after school job is necessary can also be a contributing factor.

The students participating in the IHP program bear their share of anxiety and stress, but using the tools and techniques that we taught them, they developed newfound confidence and health. This is no mean feat in communities like Chelsea and Revere where other pressures can exacerbate emotional problems. Median household income in Chelsea, for example, is two thirds of the state average, with 27 per-

cent of children living below the poverty line compared with the state average of 12.8 percent.

The objective of the IHP program is to empower high-school students to take an active role in their treatment and long-term health. With this experience, adolescents gain a deeper appreciation of their own physiology and become more cognoscente of their body's ability to heal itself and maintain homeostasis. The adolescents who participate in the program develop an understanding of preventive health treatments and assume increased personal responsibility for their overall health and well-being. This shift from an external focus of control, (e.g. a medical professional administering a pill) to an internal focus of control that is patient centered can increase awareness and self-esteem, while decreasing anxiety.

We chose the three modalities we used because they have a good evidence base for efficacy in anxiety and it is feasible to administer them in a school clinic.

## ACUPUNCTURE

Traditional Chinese medicine (TCM) includes acupuncture, which works on the principle of stimulating points in the body to correct imbalances in the flow of energy (Qi) through channels known as meridians (Ljubinovic, 2013). Acupuncture is a safe CAM modality for pediatric patients (Jindal, Ge, & Mansky, 2008).

Western medicine has made numerous attempts to explain acupuncture's mechanism of action from an allopathic perspective. While it has yet to be fully elucidated, there are certain aspects that have gained general acceptance. First, many of the over 350 acupuncture points correspond to nerve bundles or muscle trigger points. Neuroimaging studies show that acupuncture can calm areas of the brain that register pain and activate those involved in down regulating the stress response (Dhond, Kettner, & Napadow, 2007). Doppler ultrasound has shown that acupuncture increases blood flow in treated areas (Lo, Lin, Wei, & Sun, 2013). Finally, thermal imaging shows that acupuncture can decrease inflammation (Santos *et al.*, 2013; Stux, Berman, & Pomeranz, 2000).

Errington-Evans conducted an extensive literature review to evaluate the role of acupuncture in anxiety conditions (2012). Results showed statistically significant effects directly attributable to acupuncture treatment. It should be noted that the author discussed the need for improved study design, which lends influence and support to the use of acupuncture to significantly reduce the symptoms of anxiety disorders.

## AROMATHERAPY

Aromatherapy is a holistic medicine which uses the volatile oils of aromatic plants for therapeutic applications. It is concerned with the psychological, physiological and pharmacological effects of essential oils (EO). Aromatherapy can be introduced by means of inhalation, through the olfactory system, and dermal application whereby the EO is absorbed through the skin and travels through the tissue to enter the circulation (van der Watt, Laugharne, & Janca, 2008).

The effects of aromatherapy are theorized to result from the binding of chemical components in the EO to olfactory bulb receptors in the limbic system (Buchbauer, Jirovetz, Jäger 1993). Current research has also focused on topical application of EO and found that it may exert antibacterial, anti-inflammatory, and analgesic effects (Herro E, Jacob, 2010; Stea, Beraudi, & De Pasquale, 2014).

Lavender, like all essential oils, it is not a pure compound. It is a complex mixture of naturally occurring phytochemicals, including linalool and linalyl acetate. The scent has a calming effect that may aid in anxiety and stress reduction as well as overall relaxation (Hongratanaworakit, 2011; Shiina *et al.*, 2008). Further, it has been shown to reduce agitation and have sleep-promoting properties (Lewith, Godfrey, & Prescott, 2005; Lin, Chan, Ng, & Lam, 2007).

One of the major components of Lavender EO is linalool, which has been demonstrated to act postsynaptically. The possible mechanism is via the modulation of cyclic adenosine monophosphate (cAMP) activity (Lis-Balchin & Hart

1999). Linalool has been found to inhibit the GABA<sub>A</sub> binding receptor in the central nervous system of animal models and induce a relaxed state (Brum, Elisabetsky, & Souza 2001).

The grapefruit is the largest of the citrus fruits and a natural hybrid of the pummelo and sweet orange. The main chemical constituents are monoterpene hydrocarbons (limonene and myrcene), sesquiterpenes, alcohols, aldehydes, esters, and flavonoid glycosides (Feger, 2006). These constituents work in concert and have shown various applications as olfactory stimulants. They have antibacterial properties, and apoptotic activity specific to human leukemia cells (Abulrob, Suller, Gumbleton, Simons, & Russell, 2004; Hata *et al.*, 2003; Tanida *et al.*, 2008).

## SOUND THERAPY

Sound therapy has been used for centuries by many cultural, religious, and indigenous groups around the globe including, ancient Greek and Egyptian civilizations, Vedic Indian culture, Tibetan traditions, Aboriginal groups in Australia, and the American native Navajo tribes (Antrim, 2006; Cook, 1997; Gaynor, 2002).

The broad category of sound therapy includes music therapy. Fundamentally, music is organized sound and is a form of treatment well-known in allopathic medicine. Since the National Association of Music in Hospitals was created in 1926, many hospitals and clinics throughout the US have developed music therapy programs to support patient recovery (Edwards, 2008).

Early music therapy programs grew slowly, but rapid growth ensued following WWII. Soldiers returned home from the battlefields with emotional and psychological problems and music and soothing sounds provided relief and played a supportive role in their healing. In 1945, the U.S. War Department issued Technical Bulletin 187, which detailed a music therapy program created by the Office of the Surgeon General (American Music Therapy Association, 2014). It was considered supportive of occupational therapy and physical reconditioning.

The use of sound and music are non-invasive, simple and cost-effective therapeutic tools. This form of treatment has proven to reduce pain and anxiety for children undergoing medical or dental procedures. In addition, when music therapy is combined with other modalities it may be more effective than when implemented alone (Bekhuis, 2009). Sound and music have also been shown to reduce arousal during stress and support a state of calm (Pelletier, 2004). Further, a recent Cochrane review highlighted the physiologic effects of this modality and found that music may reduce the effects of coronary artery disease and decrease blood pressure, heart rate, and respiratory rate (Bradt & Dileo, 2009).

American adolescents listen to approximately 4.5 hours of music per day. The use of sound and music are processes with which they are familiar and easy to adopt (Campbell, Connell, & Beegle, 2007). In this population, music therapy has been shown to improve adolescent mood by reducing stress and lowering anxiety levels, which can help counteract or prevent depression (Misic, Arandjelovic, Stanojkovic, Vladejic, & Mladenovic, 2010).

## CONCLUSIONS

The IHP served as a model to evaluate the feasibility and efficacy of an integrative treatment program in a school-based clinical setting. The success of this program highlights the interest, need, and workability of integrative health services in school clinics. The IHP program ushers in a new paradigm for a school-based patient-centered service that involves the use of integrative modalities like acupuncture, sound therapy, and aromatherapy. These modalities are used to educate and help treat anxiety and stress-related disorders in adolescents. The IHP program offers many benefits to student participants including empowerment, education in self-care techniques, and personal responsibility for one's own health. It has the potential to foster resiliency that prepares individuals for coping with life's inevitable stressors. The overall benefits of the IHP program are decreased barriers to access to care, decreased school absenteeism for treatment appointments, cost-effectiveness, introduction to a holistic approach to treatment, and promotion of long-term preventive health care.

Even those new to integrative therapies can implement these services with relative ease. Other than medical acupuncture, clinical aromatherapy and sound therapy can be utilized with minimal training and a basic review of techniques. In lieu of acupuncture, acupressure points, which include the same point locations but stimulation of the area with manual finger pressure rather than needles can be used. These services are easy to implement, minimally to non-invasive, and cost-effective. Evidence supporting their efficacy continues to expand as well as a number of other alternative and complementary treatments. This holistic approach to patient care offers not only symptom relief but an educational component as they acquire new skills to enhance preventive health and self-care techniques.

Our hope is for similar programs to be offered in school health clinics. In addition to the three sites where the IHP was conducted, there are several other schools in Massachusetts that have met with us and are in the planning phase of initiating integrative health services in their schools. We hope to facilitate similar programs and support efforts to offer CAM therapies to the vulnerable adolescent population.

## ABOUT THE AUTHOR

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## CONFLICT OF INTEREST

Dr. Milosavljevic reports no biomedical or financial conflict of interest.

## ACKNOWLEDGEMENTS

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