Emerging Evidence for the Efficacy of Coaching for Attention-Deficit/Hyperactivity Disorder (ADHD)

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BACKGROUND: Coaching for Attention-Deficit/Hyperactivity Disorder (ADHD) emerged as a treatment modality in the 1990s but has received less attention than either medication use or psychotherapeutic interventions in the management of ADHD. Over the past decade, a research base examining ADHD coaching has begun to develop. This review summarizes extant outcomes research, suggesting directions for future study.

RESEARCH OBJECTIVE(S): (1) Identify extant research on coaching for ADHD; (2) Review and summarize outcome studies; (3) Suggest directions for future research.

METHODS: Most studies were identified through PubMed/Medline, EBSCO Megafile, Google Scholar, and ERIC databases using keywords "ADHD," "executive functions," and "coaching." One study was found in a book, and a PowerPoint describing an additional study was found online. Only outcome studies were further reviewed.

RESULTS: Of the 22 studies identified on coaching for ADHD, 19 examined outcomes. These studies varied in design—from a case study to randomized controlled trials, and included qualitative and quantitative approaches. Studies were mostly small in size, ranging from 1 to 148 participants and 10 studies had ≤ 10. Although studies focused on coaching for age groups from elementary school through adulthood, 53% focused on college students. Most studies examined individual coaching although three explored group coaching. Training and background of coaches varied; three studies examined peer coaching. Of the 19 outcome studies, 17 studies—including a quasi-experimental study and two randomized-controlled trials—demonstrated improvements in participant executive functioning and ADHD symptoms; 6 found improved well-being; 3 demonstrated maintenance of gains; 6 showed high satisfaction with coaching; and 4 examined factors associated with coaching success.

CONCLUSION: Extant research on outcomes of coaching for ADHD consistently shows positive findings. Coaching appears effective in supporting beneficial client outcomes and may contribute positively to multimodal treatment approaches. The most notable limitation in the research is the small sample size in many of the studies. Heterogeneity in study design, a wide variation in participant ages, varied background and training of the coaches, the use of individual vs. group sessions, and varied outcome measures make comparison of results between studies difficult. Future research addressing study limitations may extend current findings and could also examine factors potentially impacting the success of coaching, e.g., comorbidities, medication use, client motivation, and/or number of coaching sessions.

Emerging Evidence for the Efficacy of ADHD Coaching

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BACKGROUND

ADHD coaching emerged as a treatment modality in the 1990s. Over the past decade, a research base has begun to develop; an overview of extant research is provided herein.

METHOD

Most studies were identified through Pubmed/Medline, EBSCO Megafile, Google Scholar, and ERIC databases using keywords "ADHD," "executive functions," and "coaching". Research examining ADHD coaching outcomes and suggestions for future study are presented.

RESULTS

Of the 19 outcome studies identified, 18 studies find that ADHD coaching supports improvements in ADHD and executive functioning symptoms; 6 find improved well-being; 3 studies demonstrate maintenance of gains; and 6 show high satisfaction with coaching; 4 studies examine factors associated with coaching success.

CONCLUSIONS

ADHD coaching appears effective in supporting beneficial client outcomes and may contribute positively to multimodal treatment approaches. Further research may extend these findings, addressing limitations, and investigating factors potentially impacting the success of coaching such as comorbidities, medication use, client motivation, and number of coaching sessions.

ADHD Coaching

ADHD coaching has been defined as a collaborative, goal-oriented process that integrates life coaching, skills coaching, and education, to assist individuals with Attention Deficit/Hyperactivity Disorder in developing the self-awareness and skills necessary to fulfill their potential while navigating the pragmatic realities of living with ADHD (Wright, 2014, p. 22).

ADHD coaching shares common elements with CBT and other psychosocial treatments; however, key factors distinguish it as a unique approach:

Egalitarian and nonclinical: Partnership model with a personal-development orientation

Increased accessibility and accountability: Access to coach between sessions (text, phone, email) bolsters clients' accountability and engagement

Focus on skill acquisition and implementation: Targets clients' specific performance issues with personalized implementation plans and skill sets

Flexible structure: Client may meet with coach remotely (phone, Skype), and may meet in nontraditional settings (workplace, library)

Theoretical Frameworks

ADHD coaching theory and practice build upon the theoretical foundations of psychology and psychiatry, life coaching, education, and other fields.

The coaching evidence base reveals a broad range of frameworks applicable to the ADHD context, which target **motivation**, **implementation, self-regulation**, and **self-actualization.** A selection of frameworks is listed below. Identified studies employing a particular framework as a coaching and/or research paradigm are cited.

- **Cognitive behavioral** (Prevatt & Yelland, 2013; Reaser, 2008; Vilardo et al., 2013)
- **Executive functioning** (Dawson & Guare, 2012; Field et al., 2013; Maitland et al., 2010; Merriman & Codding, 2008; Parker & Boutelle, 2009; Parker et al., 2011; Parker et al., 2013; Plumer & Stoner, 2005; Prevatt & Yelland, 2013; Reaser, 2008; Richman et al., 2014; Swartz et al., 2005)
- **Social learning and self-efficacy** (Zwart & Kallemeyn, 2001)
- **Self-determination/empowerment** (Garcia Ron et al., 2015; Maitland et al., 2010; Parker & Boutelle, 2009; Richman et al., 2014; Swartz et al., 2005)
- **Emotional intelligence/interpersonal skills** (Evans et al., 2014)
- **Psychoeducation** (Kubik, 2011; Prevatt & Yelland, 2013)
- **Client-centered/humanistic**
- **Adult development/constructivist**
- **Transtheoretical "stages of change"**
- **Positive psychology/character/values/strengths**
- **Applied sport and performance psychology**
- **Mindfulness/Acceptance and Commitment**

Authors (Year)	*N*	Design	Coach Variation	Coaching Duration and Frequency	Outcome
ELEMENTARY STUDENTS					
Garcia Ron et al. (2015)	49	Descriptive/prospective (pretest–posttest)	Trained/certified coach	5 group sessions (monthly)	Clinical improvements in large majority of participants; clinically significant mean reduction in symptoms; high satisfaction
Vilardo et al. (2013)	4	Multiple baseline	Cross-age peer coaches	10 weeks (daily)	Decreased negative social behavior
Plumer & Stoner (2005)	3	Multiple baseline	Peer coaches (in combination with classwide peer tutoring)	12 weeks (3 days/week)	Enhanced positive peer social behavior (not occurring with peer tutoring alone)
HIGH SCHOOL STUDENTS					
Evans et al. (2014)	24 treatment; 12 comparison	Randomized controlled trial (with intent-to-treat and dosage analysis)	School personnel trained to coach (Note: coaching focused on skills training; also included parent training and interpersonal skills group)	Avg. ~27 sessions (weekly)	Treatment group had greater improvement in grades, parental perception of inattention, family relations; reliable "dosage" effect reported for academic impairment, parental ratings of impairment, family impairment
Dawson & Guare (2012)	5	Case series	School personnel trained to coach	Two marking periods (daily)	Improvement in grades
Merriman & Codding (2008)	3	Longitudinal case series	School psychologist trained to coach	~3 weeks (daily, with systematic fading)	Increased accuracy and completion of mathematics homework
TEENS and YOUNG ADULTS with ADHD and/or ASD					
Wentz et al. (2012)	10	Longitudinal (with quantitative and qualitative components)	Clinical psychologist or educational therapist trained to coach	8 weeks (2 face-to-face and up to 14 Internet sessions)	Improvement in self-esteem, sense of coherence, and subjective quality of life
COLLEGE STUDENTS					
Field et al. (2013)	88 treatment; 39 control	Randomized controlled trial	Trained/certified coaches	Mean of 16.5 sessions (weekly)	Significant pretest–posttest improvement on total and subscale Learning and Study Skills Inventory (LASSI) scores in treatment group; controlling for pretest LASSI, treatment group significantly higher posttest total and subscale LASSI scores and well-being than controls
Parker et al. (2013)	19	Qualitative (purposive sample; 88 participants from Field et al., 2013)	Trained/certified coaches	Semester (weekly)	Self-reported improvement in goal setting, coping strategies, productivity habits, self-regulation, and effective beliefs
Prevatt & Yelland (2013)	148	Pretest–posttest (with a correlational component)	Doctoral-level practicum students in Educational Psychology and Learning Systems	12–24 sessions (weekly over 2 semesters)	Significant pretest–posttest improvement on all LASSI subscales, self-esteem and quality of life; coach ratings of client progress significantly associated client motivation, between-session assignments
Parker et al. (2011)	7	Qualitative (with quantitative pretest–posttest component)	Trained/certified coaches	Semester (weekly)	Self-reported improvement in goal attainment, well-being; improvement on LASSI subscales Skill, Will, Self-regulation
Maitland et al. (2010)	6	Quantitative and qualitative with pretest–posttest	Trained/certified coaches	8–13 sessions (weekly in one semester)	Positive trend for self-determination; qualitative increases in self-determination, EF skills, life satisfaction
Parker & Boutelle (2009)	7	Phenomenological study	Trained/certified coaches	10 sessions (weekly)	Self-reported changes in thinking and behavior; development of competencies for goal attainment; enhancement of well-being, and a positive sense of the future
Reaser (2008)	6	Qualitative case series (with quantitative pretest–posttest component)	Doctoral student in Educational Psychology and Learning Systems (Note: coach was researcher)	8 sessions (weekly)	Pretest–posttest improvement on 6 of 10 LASSI subscales; self-reported gains in outlook, organization, self-awareness, self-control; coaching reported as more helpful than other ADHD treatment approaches
Swartz et al. (2005)	1	Case study with pretest–posttest	Supervised doctoral or EdS-level practicum students in Counseling and School Psychology (not specified)	8 sessions (weekly)	Improvement in 13 of 17 self-selected goals based on subscales of the LASSI and a Coaching Topics Survey
Zwart & Kallemeyn (2001)	22 w/ADHD/LD; 20 controls w/ADHD and/or LD; 11 adj. controls w/ADHD/LD	Quasi-experimental	Trained peer coaches	2–10 sessions (mean of 5.5, in one semester)	Improvement in self-esteem and 8 of 10 LASSI subscales and greater improvement than controls in 5 LASSI subscales; the adjusted control group showed improvement in only 2 LASSI subscales
COLLEGE STUDENTS and GRADUATE STUDENTS					
Richman et al. (2014)	16 treatment; 8 comparison	Quasi-experimental	Trained/certified coaches	12–24 sessions (weekly over 2 semesters)	Positive, not significant, results in measures of self-determination, academic functioning and EF skills; qualitative impact on self-determination, effectiveness, academic skills, EF and subjective well-being
ADULTS					
Kubik (2011)	45	Prospective (pretest–posttest) with additional quantitative components	Trained/certified coach	7 group sessions (6 weekly, 1 follow-up 1 month later)	Positive impact on cognitive, distractibility, social, inattentive and behavioral factors
Bloemen et al. (2007)	10	Pretest–posttest (limited description)	Coach training/qualifications not described	8 group sessions (weekly)	Functional improvement in daily life; significant others noted improvement in ADHD symptoms

Summary of Outcomes

ADHD and executive functioning symptoms and related behaviors (18 studies)

- Improved social behaviors in elementary school students (Plumer & Stoner, 2005; Vilardo et al., 2013)
- Improved grades in high schoolers (Dawson & Guare, 2012; Evans et al., 2014; Merriman & Codding, 2008)
- Clinical, symptom, or functional improvement (Bloemen et al., 2007; Evans et al., 2014; Garcia Ron et al., 2015)
- Qualitative reports of improvement in executive functioning skills and/or goal attainment (Field et al., 2013; Maitland et al., 2010; Parker & Boutelle, 2009; Parker et al., 2011; Parker et al., 2013; Reaser, 2008; Richman et al., 2014; Swartz et al., 2005)
- Pretest–posttest improvements in cognitive, distractibility, social, inattentive, and behavioral factors (Kubik, 2011)
- Pretest–posttest improvement in total and/or multiple subscale scores on the Learning and Study Skills Inventory (LASSI; Weinstein et al., 1987) (Field et al., 2013; Parker et al., 2011; Parker et al., 2013; Prevatt & Yelland, 2013; Reaser, 2008; Swartz et al., 2005; Zwart & Kallemeyn, 2001)
- Greater improvement than a comparison group on multiple subscale scores on the LASSI (Field et al., 2013; Zwart & Kallemeyn, 2001)

Self-esteem, well-being, and quality of life (6 studies)

- Pretest–posttest improvements in self-esteem (Prevatt & Yelland, 2013; Wentz et al., 2012; Zwart & Kallemeyn, 2001)
- Quantitative measures and qualitative reports of improvements in sense of coherence, life satisfaction, well-being and/or quality of life (Maitland, et al., 2010; Parker & Boutelle, 2009; Prevatt & Yelland, 2013; Richman et al., 2014; Wentz et al., 2012)

High satisfaction with coaching (6 studies)

- Participant high satisfaction with coaching, view of coaching as a helpful intervention (Garcia Ron et al., 2015; Parker & Boutelle, 2009; Parker et al., 2011; Parker et al., 2013; Zwart & Kallemeyn, 2001; Reaser, 2008)

Maintenance of gains (3 studies)

- Maintenance of coaching gains demonstrated over varied time frames (Kubik, 2010; Merriman & Codding, 2008; Wentz et al., 2012)

Several factors related to coaching success were also examined (4 studies)

- Coach ratings of greater progress associated with higher initial level of client motivation (Prevatt & Yelland, 2013)
- Coach ratings of higher client time spent on between-session assignments associated with positive changes on anxiety and study skills (Prevatt & Yelland, 2013)
- Studies vary in results related to impact of comorbidities on outcomes (Prevatt & Yelland, 2013; Field et al., 2013; Zwart & Kallemeyn, 2001)
- Coaching "dosage" effect on select outcomes (Evans et al., 2014)

LIMITATIONS OF STUDIES

- Majority of studies $N \leq 10$
- Majority lack control groups
- Plurality focus solely on college students
- Varied training of "coaches"
- Varied and inconsistent definitions/descriptions of coaching interventions and frequency/duration of sessions
- Potential confounding factors are often not addressed
- Effect sizes are not reported for many studies
- No studies of individual coaching for adults are reported

RECOMMENDATIONS

- Larger, randomized controlled studies
- Longitudinal designs to further examine maintenance—or drop-off—of gains
- Specifically describe coach training, certification, experience, and coaching interventions
- Examine potential confounding factors, including:
  - ADHD subtype/presentation, severity, functional impairment
  - Co-occurring conditions
  - Motivation for coaching
  - Concurrent tutoring, therapy
  - Medication use
  - Socioeconomic factors
- Include objective, non-self-report outcome measures
- Additional studies with adults, particularly individual coaching

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Demulcent Properties of Three Herbs Investigated Through an Online Cohort Model of Inquiry.

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BACKGROUND: Demulcent herbs are utilized to protect and heal irritated and inflamed tissues. Botanicals traditionally used for their mucilaginous properties have varying levels of demulcent properties, depending on their concentration in water, the duration of their infusion in water, method of agitation and the temperature of the water into which they are infused. While herbalists can agree that these variables influence the demulcent properties of the preparation, the degree to which each of these variables impacts the mucilaginous properties is not well documented. An online learning cohort assignment to investigate this question can generate large amounts of data while allowing students a peer supportive environment to experiment through active learning. A cohort of MUIH students examined the properties of three powders: marshmallow root (*Althaea officinalis*), cinnamon back (*Cinnamomum verum*) and slippery elm inner bark (*Ulmus rubra*).

RESEARCH OBJECTIVE(S): 1) To apply preliminary data gathered by a classroom cohort to further define variables impacting the demulcent properties of infusions of three medicinal plants, 2) To demonstrate a model of preliminary data gathering through a classroom cohort, 3) To determine next steps in investigation to determine the best way to prepare these three herbs to maximize demulcent properties

METHODS: In the Herbal Therapeutics II course (HRB620b), students were assigned an experiment with all three herbs. Each student presented a complete set of data to his/her peer group, including the concentration, temperature, agitation methods and duration of the infusion for each of the three herbs. Student participants compared their variable data through an online discussion board. In addition to overall trends in data, steps improve the cohort data-gathering model were determined.

RESULTS: The three medicinal plants provided different patterns of demulcent properties when exposed to varying levels of heat, concentration, duration and agitation. Lack of sufficient controls in experimentation by students combined with inconsistent language prevented specific determinations of demulcent qualities from being made but generated feedback to revise the assignment for future data collection by the cohort model.

CONCLUSION: Medicinal demulcent use can be optimized through preparation methods. The cohort model of gathering preliminary data offers a potentially effective method to quickly gather a mass of individual data with comparative and contrasting analysis when used with clear methods and consistent language. This information could inform future inquiries and clinical practices using demulcent botanicals.

Demulcent Properties of Three Herbs Investigated Through an Online Cohort Model of Inquiry

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Background

Demulcent herbs are utilized to protect and heal irritated and inflamed tissues. Botanicals traditionally used for their mucilaginous properties have varying levels of demulcent properties, depending on their concentration in water, the duration of their infusion in water, method of agitation and the temperature of the water into which they are infused. While herbalists can agree that these variables influence the demulcent properties of the preparation, the degree to which each of these variables impacts the mucilaginous properties is not well documented.

An online learning cohort assignment to investigate this question can generate large amounts of data while allowing students a peer-supportive environment to experiment through active learning. A cohort of MUIH students examined the properties of three powders: marshmallow root (Althaea officinalis), cinnamon bark (Cinnamomum verum) and slippery elm inner bark (Ulmus rubra).

Research Objectives

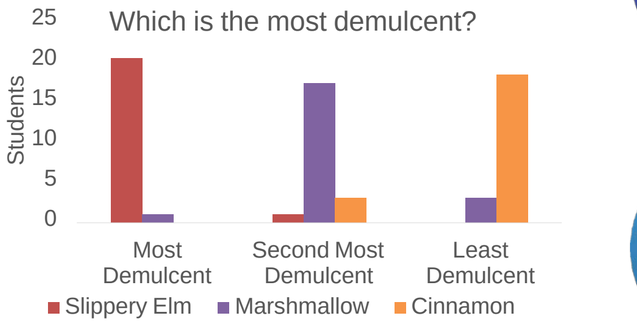
1. To apply preliminary data gathered by a classroom cohort to further define variables impacting the demulcent properties of infusions of three medicinal plants
2. To demonstrate a model of preliminary data gathering through a classroom cohort
3. To determine next steps in investigation to determine the best way to prepare these three herbs to maximize demulcent properties

Results

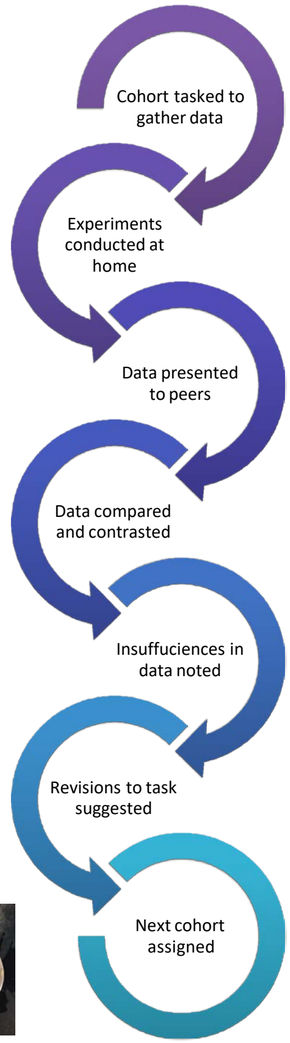
Summary: The three medicinal plants provided different patterns of demulcent properties when exposed to varying levels of heat and cold, concentration, duration and agitation. *Ulmus rubra* was the herb least impacted by temperature or concentration. *Cinnamomum verum's* demulcency was noted to be enhanced by heat. Lack of defined methods of experimentation combined with inconsistent language prevented specific determinations of demulcent qualities from being made but generated feedback to revise the assignment for future data collection by the cohort model.

Left: Student set up for the experiment in a home environment

Right: Gathering data on the demulcent properties of herbs



Student Photos



A Student Presenting her Outcomes

Methods

In the MUIH Herbal Therapeutics II course (HRB620b), students were assigned an experiment with all three herbs. Each student presented a complete set of data to his/her peer group, including the concentration, temperature, agitation methods and duration of the infusion for each of the three herbs. Student participants compared their variable data through an online discussion board. In addition to overall trends in data, steps to improve the cohort data-gathering model were determined.

Conclusion

Medicinal demulcent use can be optimized through preparation methods. The cohort model of gathering preliminary data offers a potentially effective method to quickly gather a mass of individual data with comparative and contrasting analysis when used with clear methods and consistent language. This information could inform future inquiries and clinical practices using demulcent botanicals.

Next time?

Future cohorts will have additional specifications for their methods:

1. Provided lexicon suggesting a demulcency gradient for more consistent recording.
2. Standard ratio of liquid to powder for all experiments and all herbs.
3. New objective viscosity measuring method will be implemented.

Design for a Study Exploring Individuals' Attitudes of Health and Wellness Coaching

DeMartin, R., Bolding, M., & Lichtenstein, A.

BACKGROUND: Health and Wellness Coaching (HWC) is an emerging field. Research has shown that it is an effective tool to help an individual reach and sustain lasting lifestyle changes resulting in a more balanced life, expanding capacity for managing stress, and preventing chronic diseases. While research demonstrates the positive impact of HWC, little has been published about how individuals perceive the associated benefits of working with a coach.

RESEARCH OBJECTIVE(S): Development and evaluation of a survey exploring how adult professionals view and understand the benefits of HWC.

METHODS: A "Knowledge, Attitudes, and Perception (KAP) Survey" will be created with quantitative Likert scale questions that explore the general understanding, attitudes, and interests related to HWC. The authors will also collect demographic information including prior experience with HWC. All questions will be reviewed by a faculty mentor, piloted with a test audience of fellow HWC students, and approved by the MUIH Institutional Review Board to ensure that they are valid and ethical. We will approach contacts within the Montgomery and Howard County Public School system to assist in recruiting employees for our study. Participants will be provided with a link to an anonymous online survey, which will remain active for thirty days. Based on a Six Sigma calculation, the sample size will be sixty-seven participants.

DISCUSSION: The intention of the study is to provide coaches in HWC with a greater understanding of adult professionals' attitudes towards HWC. This knowledge may help coaches determine the best approach to promote the field and their services. The authors are unaware of any previous research that examines coaching perspectives among adult professionals.

Design for a Study Exploring Individuals' Attitudes of Health and Wellness Coaching

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Research Objectives

To explore how adult professionals view and understand the benefits of Health and Wellness Coaching (HWC) using a mixed method approach.

Background

Health and Wellness Coaching is an emerging field.

- According to the National Wellness Institute, there are over 30,000 HWC coaches. (1)
- "The World Health Organization estimates that as much as 80 percent of premature heart disease, stroke, and type 2 diabetes and 40 percent of cancers could be avoided entirely if Americans avoided tobacco, developed healthier eating habits, and were more physically active." (2)

Research has shown that HWC is an effective tool to help an individual reach and sustain lasting lifestyle changes resulting in a more balanced life, expanding capacity for managing stress, and preventing chronic diseases. A systematic review of the effects of HWC indicates that HWC:(3)

- provides positive effects on chronically ill patient's lives
- motivates changes in chronically ill patients' lifestyle behavior
- improves a patient's physical and mental health status
- supports the management of chronic diseases

While research demonstrates the positive impact of HWC, little has been published about how individuals perceive the associated benefits of working with a coach.

Methods

Population

- 100 random adult professionals divided into two groups to account for those familiar with HWC concept (Group A) and those who are not (Group B).
- This two group concept will be beneficial for differentiating attitudes and perception towards HWC when analyzing survey results and recommending HWC promotional strategies.

Data Collection

- HCAMQ based survey to assess the perception and awareness of HWC (4)
- Results Group A vs. results Group B

Outcome

- Self-reported indicators of HWC perception, measured via Likert scale

Survey Sample

Quantitative Questions

Original HCAMQ Question	Revised Question
Positive thinking can help you fight off illness.	Positive thinking can help you improve your well-being.
Complementary medicine should be subject to more scientific testing before it can be widely accepted by doctors.	Health and wellness coaching should be subject to more scientific testing before it can be widely accepted.

Likert Scale

Strongly Agree	Agree	Mildly Agree	Mildly Disagree	Disagree	Strongly Disagree

Qualitative Question

What do you think health and wellness coaching is?

Study Design

Through evaluation we have decided to base our survey on the Holistic Complementary and Alternative Medicine Questionnaire (HCAMQ).

- Cross Sectional Study to analyze two different population groups.
- II-Item Scale Survey for stronger reliability.
  - 6 Questions on perception of HWC.
  - 5 Questions on perception of holistic health (HH).
- Mixed Method Approach (Quantitative and Qualitative)
- Likert Scale Questions to analyze quantitative data results.
- Themetic Analysis to examine qualitative data.

Study Flow

Generate Survey
Review HCAMQ Questions
Modify HCAMQ Questions

↓

Review Survey
Mentor Reviewed Questions
Pilot Test
Internal Review Board Approval

↓

Perform Survey
Online Survey

↓

Analyze Data
Qualitative Data Analysis
Quantitative Data Analysis

↓

Present Results

Discussion

The intention of the study is to provide coaches in HWC with a greater understanding of adult professionals' attitudes towards HWC. This knowledge may help coaches determine the best approach to promote the field and their services. The authors are unaware of any previous research that examines coaching perspectives among adult professionals.

The HCAMQ questionnaire focuses on alternative and complementary medicine and not specifically to Health and Wellness Coaching. Questions will be rephrased to reflect HWC while maintaining the validity of the HCAMQ.

The sample groups in this research design reflect only a sector of the general public and may not represent a diverse population. We will obtain demographic data from our participants including age, gender, occupation, marital status, and educational background. This data will be used within our analyses and presentation of the study results.

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Peppermint and Lactation: Rationale and Design for a Series of N-of-1 Randomized Control Trials

Freeman, C., & Snow, J.

BACKGROUND: Informal reports and popular online breastfeeding sites suggest that peppermint (*Mentha* x *piperita*) intake is associated with decreased breast milk production. Despite anecdotal reports to this effect, no peer-reviewed publications address this phenomenon, nor can it be explained by known mechanisms of action. Reports of decreased supply after consumption of peppermint candies and cookies suggest that the oil may be the active fraction if there is an effect.

RESEARCH OBJECTIVE(S): The study aims to evaluate the effect of peppermint oil consumption on breast milk production in a series of individuals. The study will provide preliminary data to assess the feasibility and need for a larger trial.

METHODS: The study involves a small series (n=3-5) of double-blind n-of-1 randomized control trials. Inclusion criteria are active lactation, pumping exclusively (i.e. not breastfeeding), and being >6 months postpartum. Exclusion criteria are pregnancy and a history of hepatic or gastrointestinal disease.
Participants will complete a five-day run in period followed by three ten-day phase-pairs. Each phase- pair will be randomized so that the participant receives peppermint oil (180mg enteric-coated capsules, T.I.D.) or a matched placebo for the first five days and then "crosses over" for the second half of the phase-pair. Participants will pump breast milk as usual, collect it in a provided container, and record the total volume daily. The primary outcome for each n-of-1 trial will be the difference in mean daily milk volume between placebo and treatment days.

DISCUSSION: This study will help build a knowledge base concerning peppermint oil's effects on lactation. Lactating individuals may be able to use the n-of-1 RCT model to determine whether peppermint affects milk supply. Future studies may be needed to identify dose-response effects and to identify sub-populations that are likely to respond to peppermint oil.

Peppermint and Lactation: Rationale and Design for a Series of N-of-1 Randomized Control Trials

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Maryland University of Integrative Health

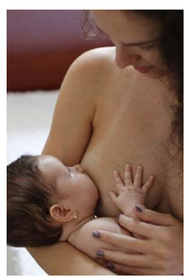
Background

Anecdotal reports suggest that peppermint (*Mentha* x *piperita*) intake is associated with decreased breast milk production. There are no published case reports or research that address this phenomenon, nor can it be explained by known mechanisms of action. Despite the lack of formal evidence, lactating women are often cautioned about the consumption of peppermint containing foods and beverages.[1,2]

Reports of decreased supply after consumption of peppermint candies and cookies suggest that the essential oil may be the active fraction if there is an effect.[3,4]

N-of-1 randomized control trials (RCTs) are a type of single case research that helps to minimize bias. They involve a within-patient, multiple crossover design and are double-blinded when possible. N-of-1 RCTs are better equipped than a single-patient case report to demonstrate a cause-effect relationship between an intervention and an outcome.[5]

N-of-1 trials are a useful design when it is suspected that there could be considerable between-person variability in response to the intervention. Anecdotal reports suggest this to be the case with peppermint and breast milk production.



Research Objectives

The study aims to evaluate the effect of peppermint oil consumption on breast milk production in a series of individuals. The study will provide preliminary data to assess the feasibility and need for a larger trial.

Methods

Design

We propose a small series (n=3-5) of double-blind n-of-1 RCTs. The intervention will be administered in three 10-day blocks, with each block composed of two 5-day phases. In each block, participants will be randomly assigned to receive peppermint oil for one phase and a matched placebo in the other phase. There will be a 5-day run-in period at the beginning of each trial to clarify procedures and establish baseline measures. No washout period will be used between phases due to the short half-life of peppermint oil fractions. (See figure 1)

Participants

Between three and five lactating women will be recruited via email from breastfeeding centers throughout the US. Inclusion criteria are active lactation, pumping exclusively (i.e., not breastfeeding), and being >6 months postpartum. Exclusion criteria are pregnancy and a history of hepatic or gastrointestinal disease.

Intervention

Participants will take enteric-coated peppermint oil capsules (180mg/capsule) or a matched placebo TID. Both active and placebo capsules are triple-coated to mask peppermint odor. The placebo capsules contain 100% fiber while active capsules contain 60% fiber.

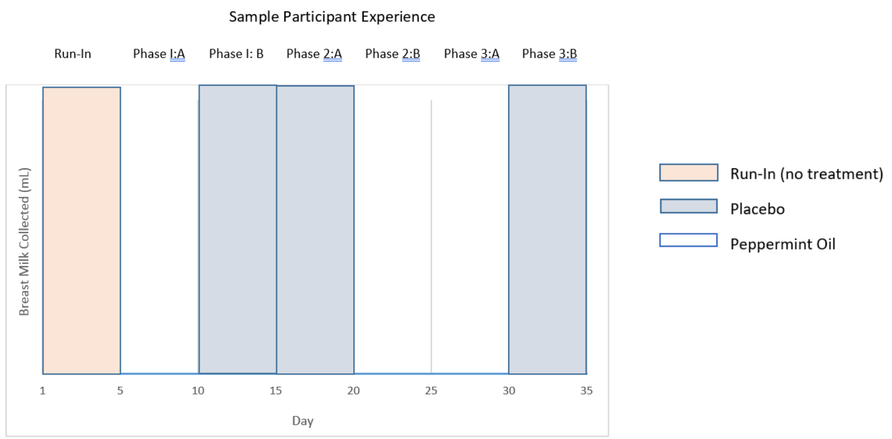
Randomization and Blinding

The order of interventions within each of the three phase-pairs will be assigned to each participant using a computer-generated randomization schedule. Sequence codes will only be known by a designated staff member at the MUIH dispensary not further involved in the trials. The staff member will package 6 bottles of pills for each participant, one bottle corresponding to each of the phases. The researchers and participants will be blinded to treatment allocation.

Outcome and Analysis

The primary outcome will be the volume of breast milk produced as recorded by the participants. Participants will be instructed to pump milk as usual. They will collect the milk in provided containers and record the total volume in milliliters each day. Results will be graphed for visual analysis (a standard analytic technique in single case research).[6] Difference in mean daily milk volume between placebo and treatment days will be calculated.

Figure 1:



Discussion

The current study investigates the effect of peppermint oil on lactation in a small series of individuals. The study will provide the first systematically collected data on the subject and can provide preliminary results to inform future research.

Complementary and integrative health disciplines emphasize the variability of treatment responses between clients. N-of-1 trials provide a rigorous research methodology that accommodates this perspective. Lactating individuals may be able to use the n-of-1 RCT model to determine whether peppermint affects their own milk supply. The current study may also stimulate interest in the use of n-of-1 RCTs for other clinical questions relevant to this population.

If peppermint oil negatively affects breast milk production in some people, it is important to raise awareness within the community of lactating dyads and those who care for them. If peppermint oil does not impact supply, restrictions on peppermint consumption should be reconsidered.

If results of the study justify further investigation, future research will need to identify dose-response effects and to identify sub-populations that are likely to respond to peppermint oil. It is important to note that this study uses a dose of peppermint oil greater than that found in peppermint tea or peppermint-containing foods. Other preparations and doses may have different effects on breast milk production.

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Characterization of Adult Five-Element Acupuncture Patients in the United States

Hockmeyer, T., Most, H., York, A., Gigliotti, T., & Snow, J.

BACKGROUND: Five-Element style acupuncture is distinct from the more common TCM style. Patients receiving Five-Element acupuncture treatment in the United States have not been described.

RESEARCH OBJECTIVE(S): The purpose of this cross-sectional descriptive study was to characterize the Five Element sub-population of acupuncture patients.

METHODS: Patients of alumni/students of two U.S. Five-Element acupuncture schools were provided a link to an anonymous online survey. Most of the questionnaire was extracted from the Adult Alternative Medicine supplement to the 2012 NHIS and included The PROMIS Global Short Form v1.1. Questions addressed: 1) Motivations for seeking care (positive health and well-being, health concerns, health behavior change, alignment with principles/philosophy of CAM, experience with conventional care); 2) Global health; 3) Health-related behaviors; 4) Basic demographics.

RESULTS: Descriptive statistics were performed for each section of the survey on participants who completed the questionnaire [(n = 126); # distributed and response rate unknown]. Mean (SD) respondent age was 50.8 (13.3) years; 78% female; 97% white. Most respondents reported seeking acupuncture for specific health concerns (81%), focus on "whole" person (73%) and general wellness/ disease prevention (65%). Global health was generally rated as "Very Good." Of respondents, 45% reported being bothered "Sometimes" by emotional problems in the previous 7 days, 55% reported "Mild" fatigue, and 73% reported "Mild" pain or less. Meditation was the most frequently reported mindfulness practice (51%) followed by yoga (40%). Of respondents, 60% reported $\geq$ 7.1 hours of sleep/day; 51% reported >$100,000 annual household income; and 56% completed a "Master's degree or higher."

CONCLUSION: Findings suggest Five-Element patients seek acupuncture for both general well-being and health concerns, supporting previous findings of acupuncture (unspecified or TCM) most often sought to treat a specific health condition and more recent findings of an increase in acupuncture to promote general wellness. Our findings support previous findings that acupuncture use is driven by socioeconomic factors.

Characterization of Adult Five-Element Acupuncture Patients in the United States

Hockmeyer, T.R., Most, H., York, A., Gigliotti, T., & Snow, J.
Maryland University of Integrative Health

Background

- Acupuncture is characterized by a diversity of styles (e.g., Traditional Chinese Medicine, Western medical, Five Element) raising the possibility that patient populations vary by style.
- Few studies have sought to characterize patients undergoing acupuncture treatment: Patients receiving Five Element acupuncture treatment have not been surveyed and described.
- A better understanding of the patient population can help guide Five Element-based education, clinical, and research initiatives.

Research Objectives

- The purpose of the current study was to describe the adult patient population receiving care from Five Element-based U.S. acupuncturists.

Methods

- **Design:** Cross-sectional, descriptive survey.
- **Sample**: Patients of alumni and students from two Five Element acupuncture schools in the U.S. (MUIH, Laurel, MD; Academy for Five Element Acupuncture, Gainesville, FL).
- **Questionnaire:** The survey included questions regarding: A)Motivations for seeking care; B) Self-reported physical, mental, and social health; C) Health-related behaviors; and D) Basic demographics. Questions were extracted from the Adult Alternative Medicine supplement to the 2012 National Health Interview Survey.[1] The Global Short Form v1.1, developed by Patient Reported Outcomes Measurement Information System (PROMIS), was included to measure self-assessed physical, mental, and social health.[2]
- **Data Analysis**: Descriptive statistics were performed for each section of the survey. Analysis was from subjects who completed all sections (subjects with missing data from Demographics included). Global physical and mental health were scored based on the scoring guidelines for the PROMIS questionnaire: raw scores were converted to T-scores and mean(SD) was computed for each.

Results

- **Participants:** One hundred and ninety-two participants answered at least a portion of the survey; 126 respondents met the criteria for inclusion in data analysis.
- **Demographics:** Mean (SD) respondent age was 50.8 (13.3); 78.4% were female; 97% were "White"; 66% were "Employed or self-employed for wages"; 51% reported household income ≥ $100,000 annually and 56% of respondents had completed a "Master's degree or higher".
- **Motivations for Seeking Acupuncture:** See Table 1 and 2. Additional reasons included that "it focuses on the whole person" (73%) and that "it treats the causes" (61%). Most participants (74%) were not seeking acupuncture for behavioral reasons such as to eat healthier.
- **Health Related Behaviors:** "Meditation, guided imagery, or progressive relaxation" (50.8%) was the most frequently reported mindfulness practice; 76% reported 30+ minutes of physical activity at least 3 days/week; 49% reported 7.1 – 8.0 hours of sleep/day; 91% reported consuming "0-7" alcohol beverages/week; and 64% reported "never" using tobacco.
- **Self-Reported Health**: Participants most commonly rated their general health (41%), quality of life (55%), physical health (45%), mental health (40%), satisfaction with social relationships (39%), and ability to carry out social roles (48%) as "Very Good" (see Figure 1).

Figure 1

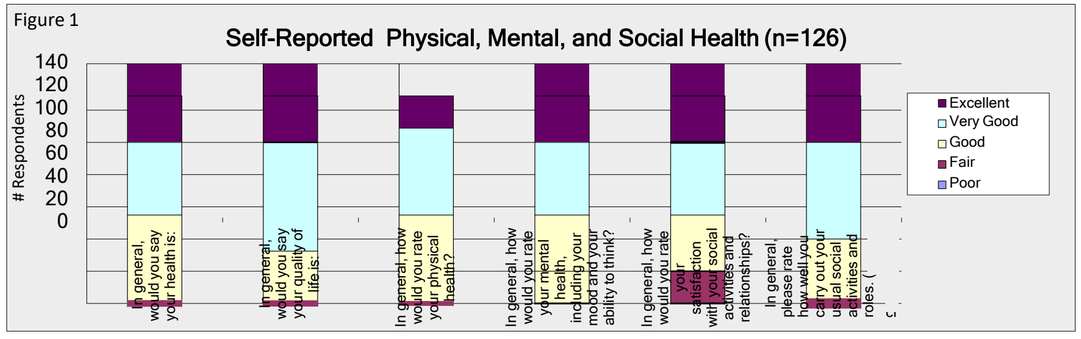

Table 1

Seeking Acupuncture for Specific Health Problems, Symptoms, or Conditions (n=126)		
Yes	81.0%	102
No	19.0%	24
Top 10 Specific Concerns		
Feeling anxious, nervous or worried	31.7%	40
Frequent stress	33.3%	42
Joint pain or stiffness/Other joint condition	27.0%	34
Fatigue or lack of energy more than 3 days	20.6%	26
Muscle or bone pain	24.6%	31
Stomach or intestinal illness	15.9%	20
Back pain or problem	23.8%	30
Chronic pain	13.5%	17
Neck pain or problem	20.6%	26
Insomnia or trouble sleeping	16.7%	21

Table 2

Health and Wellness Reasons	Response Percent	Response Count (n=126)
For general wellness or general disease prevention	65.1%	82
To improve my energy	44.4%	56
To improve my immune function	34.1%	43
To improve my athletic or sports performance	5.6%	7
To improve my memory or concentration	11.1%	14
To improve my physical well-being	67.5%	85
To help me to sleep better	31.8%	40
To give me a sense of control over my health	23.8%	30
To help to reduce my stress level or relax	55.6%	70
To make me feel better emotionally	46.0%	58
To explore the meaning/purpose in my life	15.1%	19
None of the above	4.8%	6

Conclusion

- Five Element consumers were primarily older white females with high levels of income and education.
- Findings suggest that Five Element patients seek acupuncture for both health concerns and general well-being but not for behavior change.
- Our findings suggest that Five Element patients are generally healthy and practice health-supporting behaviors.
- Our findings support previous findings that acupuncture use is driven by sociodemographic factors.[3] Efforts are needed to expand delivery of this treatment modality to differing populations. Initiative may include increasing the number of community acupuncture offerings and encouraging practitioners to set up practices in more diverse communities.
- These findings also suggest that Five Element student practitioners should be trained to treat a range of emotional disorders, including feelings of anxiety, nervousness, worry and stress.
- Research initiatives are needed to assess the effectiveness of Five Element acupuncture in treating commonly seen health concerns as well as in promoting health and well-being.

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- The authors wish to thank the administration, alumni and students from The Academy of Five Element Acupuncture in Gainseville, FL, and the Maryland University of Integrative Health in Laurel, MD, for their time and effort in making this study possible.

Effects of Time on Traditional Ethanol Extraction by Maceration: A Research Design

Missenda, M., & Miller, B.

BACKGROUND: In the 1500s, Paracelsus popularized herb extraction using long macerations times in low percentage hydro-alcoholic solutions; there has since been debate over the optimal duration length of extraction (Raubenheimer, 1910). With the development of more complex methods to shorten maceration times, the scientific focus on this traditional method of extraction (TME) is no longer a priority of the research community. Despite this shift, the practice of traditional methods of extraction continues around the world today and is often handed down without justification. This research will use two phytomedicines to explore the rationale behind this traditional step in extraction. To our knowledge, there has been no previous research focusing on justifying this step of the process.

RESEARCH OBJECTIVES: To explore hydro-alcoholic extraction by maceration using materials accessible to the small-scale herbalist to determine the optimal duration of extraction of plant constituents.

METHODS: Two samples of fresh and dried *Hydrastis canadensis* and *Echinacea angustifolia* roots will be used to test the optimal extraction time using the TME. The plant material will be ground/grated to a uniform consistency and prepared to a 1:5 concentration with ethanol. The percentage of solvent will be based on the relative water content in the dried vs. fresh root (maximum = 94.5% and minimum = 60%). This percentage of alcohol exceeds the minimum required to minimize the negative impact on the final product. Each sample will be stored at room temperature, in a light protected container with controlled agitation. Samples of each extract will be taken at 1, 3, 7, 14, 30 and 60 days. To assess the extent of extraction the following tests will be used- pH to assess the extraction of the key alkaloids and organoleptics based on American Herbal Pharmacopoeia (AHP) standards.

DISCUSSION: The current practice based on TME reflects a large range of standard maceration times that range from 3 days to up to 1 year; with the standard practice of 7-14 days reported in the 19th century for most herbs. Evaluating the optimal duration will serve to improve extract quality using this TME.

Effects of Time on Traditional Ethanol Extraction by Maceration: Research Design

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Maryland University of Integrative Health
Corresponding author: Marybeth Missenda mmissenda@muih.edu

BACKGROUND

In the 1500s, Paracelsus popularized herb extraction using long macerations times in low percentage hydro-alcoholic solutions; there has since been debate over the optimal duration length for extracting the phytochemicals of medicinal plants (Raubenheimer, 1910). With the development of more complex methods to shorten maceration times, the scientific focus on this traditional method of cold hydro-alcoholic extraction is no longer a priority of the research community. This is primarily driven by commercial needs to speed up the extraction process. Despite this shift, the practice of traditional methods of extraction continue around the world today by many small scale herbalist and their methods are often handed down without justification.

An informal survey of herbalist by the authors, illustrated that the current practice of cold maceration of hydro-alcohol extractions can range from 2 weeks to up to a year, with the average being about 4-6 weeks (survey, 2017; Vertolli,2012). Popular teaching resources for students recommend maceration for 14 days (Green, 2000; Adams & Tan,1968; Easley & Horne, 2016).

This research will use two phytomedicines to explore the rationale behind this traditional step in extraction. To our knowledge, there has been no previous research focusing on justifying this step of the process.

Hydrastis canadensis (Goldenseal) and *Echinacea purpurea* (Echinacea) were chosen for their characteristic organoleptic profiles to help assess the quality of the extractions.

The goal here is not to standardize the extraction of one medicinally "active" constituent but to optimize the extraction of as many phytochemicals using a traditional method of extraction which preserves the integrity of the whole plant medicine.

RESEARCH OBJECTIVES

To explore hydro-alcoholic extraction by maceration using materials accessible to the small-scale herbalist to determine the optimal duration of extraction of plant constituents.

At what point has saturation of the solution occurred? Does longer duration times positively or negatively affect the extraction?

METHODS

Materials

Herbs

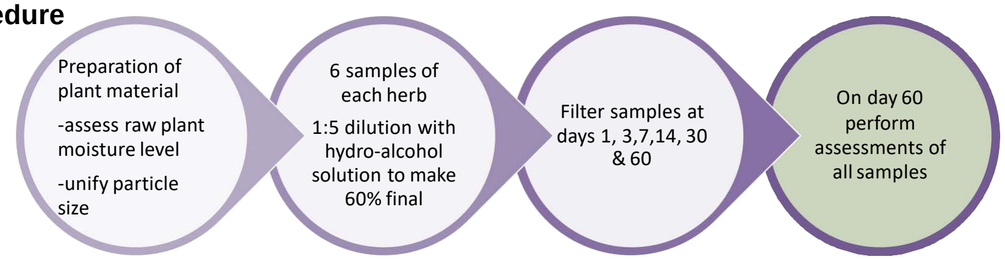
Echinacea purpurea - Pacific Botanicals™

Hydrastis canadensis -Hardings Wild Mountain Herbs™

Supplies

48 x 50ml Infinity jars (UV light resistant)
94.5% Ethyl Alcohol
Purified Water (Reverse Osmosis)
Coffee grinder
Standard Testing Sieves (2000 microns -10 mesh)
Microtiter 96-well polystyrene plate, 0.1 to 0.2mL
Filter

Procedure



Variables to be Controlled

Ambient temperature will be monitored daily

UV blocking jars

Moderate fine particle size as defined by WHO

Agitated Daily manually for 60 seconds

Assessing the Filtrate

Assessment (performed in duplicate)	*Echinacea angustifolia*												*Hydrastis canadensis*											
	Dry						Fresh						Dry						Fresh					
	24 hr	Day 3	Day 7	Day 14	Day 30	Day 60	24 hr	Day 3	Day 7	Day 14	Day 30	Day 60	24 hr	Day 3	Day 7	Day 14	Day 30	Day 60	24 hr	Day 3	Day 7	Day 14	Day 30	Day 60
Color	Colorimetry by photograph to identify RGB changes to color and Luminosity AB to identify density changes.																							
Taste	AHPA organoleptic standards for tasting of herbs will be used (AHPA ,2013, p11-13 & 32)												WHO guidelines for assessing bitterness of Hydrastis samples via serial dilution and comparison to standard (*cinchona* bark)											
Visual particulates	Assess clarity of solution and presence of visible particulate																							
Oral Chemesthesias	Serial dilution and comparison to standard Echinacea root tincture (purpurea)												A Chemesthesias effect is not expected for this herb											

DISCUSSION

Currently, many herbalists prepare their macerations based upon teachings and tradition that have been passed down from teacher to student, ranging from two weeks to several years. It is essential, as educators and medicine-makers who are relying on traditional methods of extraction, to have a concrete basis for teaching our students procedures that will maximize the effectiveness of their preparations made using traditional methods. As the practice of herbalism and medicine making expands in the context of modern science, it would be valuable to have a framework for teaching our students methods that blends traditional teachings with contemporary research. The results of this study will show, based on organoleptic assessment, whether maximum extraction happens within the first few days, as some herbalists assert, or if it is necessary to allow the preparations to macerate for four weeks or more, as is tradition.

With additional funding these results can be further validated by using more advanced methods of assessment like HPLC to identify the presence and amount of key constituents, although the goal here is to optimize the extraction of as many constituents as possible to reflect the synergy present in the whole plant.

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Characteristics of Students Pursuing Yoga Therapy Training in a University Setting: A Mixed- Methods Approach

Moonaz, S., Sullivan, M., Meyerink, T., & Alger, J.

BACKGROUND: The professionalization of yoga therapy in the West has seen the first Masters of Science (MS) in yoga therapy at Maryland University of Integrative Health (MUIH). The first student cohort recently graduated. Little is known about yoga therapy student characteristics in university settings; this information would help to define the role of higher education in training yoga therapists.

RESEARCH OBJECTIVE(S): To characterize students pursing an MS in yoga therapy, including demographics, prior training, motivations and career plans.

METHODS: A mixed-methods, nested study design was used. Second year students were recruited. Participants completed a short survey and semi-structured interviews conducted by three trained interviewers from other academic departments. Trained qualitative coders identified major themes from transcribed interviews, achieving consensus on the final codebook and theme assignment using NVivo 11 Pro.

RESULTS: 19/22 students from the first cohort completed the survey; 18 completed interviews. Participants were mostly female (89%), married (53%) with a mean age of 51 years (range, 28-64), and lived mostly in Maryland and surrounding states. Heterogeneous undergraduate majors were represented, with 5 students having another graduate degree. Most were practicing yoga for 10+ years and teaching an average of 12.6 years (range, 2-39). Most students listed multiple styles of former yoga training; Ashtanga and Integral most commonly. Half were already practicing yoga therapy, and most described their current job as "yoga teacher." Major themes from interviews included: Yoga Experience, Teaching Career, Therapy Career, and Program Recommendations. Participants discussed motivations for a yoga therapy career, why a university setting, level of preparation for graduate school and career, post-graduate plans, and recommendations for the program.

CONCLUSION: Students in the first cohort of the nation's only MS in yoga therapy tended to be middle- aged female yoga teachers from surrounding states. Prior experience and training was heterogeneous for both yoga and academic degrees. The credibility of a graduate degree was a strong motivator for enrollment and preparation for the rigor of the program was varied.

Characteristics of Students Pursuing Yoga Therapy Training in a University Setting: A Mixed-Methods Approach

Steffany Moonaz, Marlysa Sullivan, Tara Meyerink, Jon Alger
Maryland University of Integrative Health

Background

The professionalization of yoga therapy in the West has seen the development and implementation of the first Masters of Science (MS) in Yoga Therapy, which is also an IAYT-accredited program. Two cohorts have now graduated, with three more cohorts currently matriculating. Little is known about the characteristics, motivations, and expectations of students pursuing yoga therapy training in university settings.

Mixed methods research provides an opportunity to quantitatively characterize populations with descriptive statistics, while also gaining deeper understanding of the narratives driving behavior and outlook. This study aims to contribute to current understanding of the yoga therapy workforce by characterizing this population through quantitative and qualitative research methods.

Research Objectives

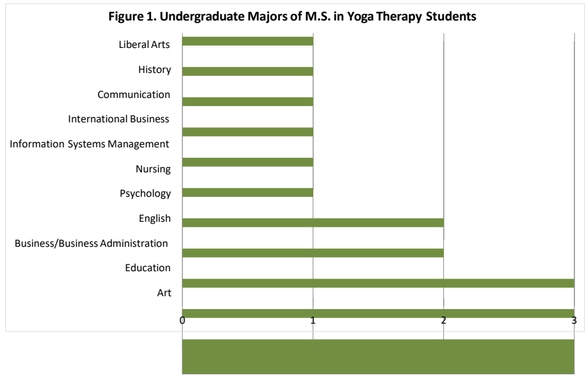
To characterize students pursing an MS in Yoga Therapy, including demographics, yoga and academic training, perspectives and motivations regarding their yoga therapy training, and future career plans.

Methods

- Students from the first cohort of the MS in Yoga Therapy at the Maryland University of Integrative Health were recruited for the study during their second year in the program.
- Following an informed consent process, quantitative data was collected using a written survey. Outcomes included individual and household demographic information and characteristics of yoga training, yoga experience, and academic education.
- Respondents who completed the written survey were scheduled for in-person interviews with university faculty from integrative health disciplines outside of yoga therapy, trained in the conduct of semi-structured interviews.
- Interviews were not recorded to preserve confidentiality, and interview responses were transcribed by faculty interviewers.
- A codebook was developed by trained qualitative coders from integrative health disciplines outside of yoga therapy, who then reached consensus on the themes and subthemes assigned to text from each transcribed interview. Nvivo 11 Pro was used to organize and analyze coded text.
- The MUIH Institutional Review Board reviewed and approved the study protocol. All participants were assigned unique numeric identifiers to maintain confidentiality and all data was maintained in accordance with privacy laws.

Results

Out of 21 total students in the first cohort, 19 participated in the written survey and 18 completed the interview. Participants were mostly female (89%), married (53%) with a mean age of 51 years (range 28-64), living primarily in Maryland and surrounding states (74%). Most had been practicing yoga for 10+ years and teaching an average of 12.6 years (range 2-39). Half were already practicing yoga therapy and most described their current job as "yoga teacher."



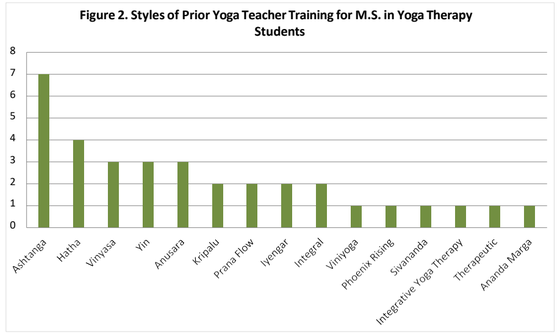


Table 1. Most prevalent qualitative themes identified from in-depth interview transcripts with first cohort of students MS in Yoga Therapy

Category	Code (Theme)	Definition	Example	Frequency
MUIH Support	Support from Cohort	How students felt supported by cohort	"The mentoring program is very beneficial... Exchanging ideas and working through challenges."	18
Curriculum Gaps	Course Continuity	Suggestions to improve course content delivery, sequence	"Add a research methods class and a capstone project."	18
Tradition Connection	Non-lineage Program	Attitude toward non-lineage-based curriculum	"Allows exploration of different lineages, gives a broad perspective."	18
Program Rigor	Yoga Preparation	Whether previous yoga training prepared them for rigor of MS program	"I never learned much anatomy and physiology in my yoga training."	16
MUIH Support	Support from Faculty	How student felt supported by faculty	"Good and timely response from faculty, library."	16
Career Preparation	Skills and Knowledge	Indicates whether graduate degree prepared them for career in yoga therapy	"I will spend the rest of my life integrating all of this knowledge into my practice, particularly with the clinical experience."	16
Program Rigor	Academic Preparation	Belief that previous formal academic training prepared them for rigors of MS	"I felt no pressure due to my previous Liberal Arts degree."	14
Career Preparation	Career confidence	Level of confidence that they will be able to pursue a career in yoga therapy	"I now have the confidence, background, and framing around it."	14

Discussion

The field of yoga therapy has experienced recent growth in research, clinical application, and professionalization via program accreditation and individual credentialing [1-3]. This growth parallels the evolution of fields such as physical therapy, moving from certificate to academic degree and into accreditation and credentialing to meet public and healthcare needs[4].

Students in the MS in Yoga Therapy are generally middle-aged females from the geographic region surrounding the university. Prior to enrollment, they were generally experienced yoga teachers and/or yoga therapists with diverse academic and yoga training. Common themes discussed during in-depth interviews included: Support from cohort, course continuity, non-lineage program, yoga preparation, support by faculty, career preparation, and career confidence.

Several concepts emerged from the text that suggest a need and desire among students for skills that translate to collaborative integrative care, which can be addressed in both academic and non-academic settings. These perspectives include: interest in research, positive attitude toward a multi-lineage approach, lack of strong prior training in biomedical subjects, mentoring and collegial support.

Understanding student demographics, experience, perceptions and motivations in choosing higher education for yoga therapy training could help to clarify the needs and expectations of students and inform the role of higher education in the training of yoga therapists. This information may also inform recruitment and retention as prospective yoga therapists consider programs and may provide useful information as the field moves from self-regulation towards professional licensure.

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Dry Needling is One Type of Acupuncture: A Literature Review

Most, H.

BACKGROUND: Acupuncture has been practiced in Western countries for more than 40 years. Recently, dry needling, a type of therapy using acupuncture needles, has gained popularity among physical therapists, generating strong debate between trained acupuncturists and physical therapists as training requirements differ significantly between groups.

RESEARCH OBJECTIVE(S): The aim of this review was to investigate components of acupuncture and dry needling and gauge similarities and differences to determine steps for ensuring patient safety with dry needling.

METHODS: Reviewer selected four features of needling technique, exploring the similarities and differences between dry needling and acupuncture, including: 1) needles used; 2) target points; 3) action mechanisms; and 4) therapeutic effects. A PubMed search with search terms “acupuncture” and “dry needling” for the years spanning 1941 to 2015 was completed to determine number of publications retrieved for each (to gauge level of interest) and how levels of interest changed. Inclusion criteria included all study types in both acupuncture and dry needling.

RESULTS: From 1941-2015, 2,163 articles were found for dry needling and 23,947 for acupuncture. The published papers showed that dry needling proponents used the language and tools of acupuncturists. Both modalities share needles, target points, action mechanisms and therapeutic effects, and treat musculoskeletal disease effectively. However, dry needling training generally is significantly less than acupuncturists’.

CONCLUSION: Dry needling is one type of acupuncture, and therefore requires adequate training to ensure patient safety. Collaboration and integration should be strengthened between dry needling practitioners and acupuncturists so that the patients can receive safe and high-quality treatment. This can only occur with adequate training. Solutions include: sharing resources for further research and mutual benefit between the two disciplines; adequate training for anyone who uses acupuncture needles in clean-needle skills; establishment of regulations for education and training of dry needling practitioners; and establishing continuing education requirements.

Dry Needling is One Type of Acupuncture: A Literature Review

Heidi Most, D.Ac., Associate Professor
Maryland University of Integrative Health

Background

Acupuncture has been practiced in Western countries for more than 40 years.[1] Recently, dry needling (DN), a type of therapy using acupuncture needles by non-acupuncturists for myofacial pain, has gained popularity among physical therapists, generating strong debate between trained acupuncturists and physical therapists as training requirements differ significantly between groups. Scarce literature exists that comprehensively compares the two needling therapies' history, theory, research and practice.[2]

Research Objectives

The aim of this review was to investigate biomedical differences and similarities between acupuncture and DN; to determine if DN is a type of acupuncture; to understand the conflicts between acupuncturists and non-acupuncturists concerning DN; and to make recommendations to reduce these conflicts.

Methods

The first reviewer selected four features of needling: 1) types of needles used; 2) target points; 3) action mechanisms; and 4) therapeutic effects. The literature was reviewed to explore these 4 features, in order to determine the similarities and differences between DN and acupuncture, and to determine the historical use of the term "dry needling." In addition, a PubMed search with search terms "acupuncture" and "dry needling" for the years spanning 1941 to 2015 was completed to determine number of publications retrieved for each, in order to gauge growth and level of interest in acupuncture and DN. Inclusion criteria included all study types in both acupuncture and DN.

Results

Reviewed papers showed that DN proponents used the language and tools of acupuncturists. Both modalities share needles, target points, action mechanisms and therapeutic effects, and treat musculoskeletal pain effectively.[1,2,3,4,10] However, DN training is significantly less than acupuncturists' training in needling.[5] Increased training leads to safer needling practices and reduction of adverse events.[1,5] From 1941-2015, 2,163 articles were found for dry needling and 23,947 for acupuncture, indicating that research significantly lags behind acupuncture;[10] DN mechanisms are understood through acupuncture research, and possibly that DN would not have become an established modality if not for acupuncture.[9]

Training for acupuncturists and physical therapists practicing DN

Growth of interest in DN and Acupuncture[5]

Span of Years	# of Years	# DN articles	# Acu articles	Avg. interest in DN as a % of Acu
1941-1970	30 years	17	551	3.1%
1971-2000	30 years	450	7,781	5.7%
2001-2015	15	1,696	15,615	10.8%

Conclusion

Because acupuncture and DN share the four features investigated, DN is one type of acupuncture, and therefore requires adequate training to ensure patient safety. Collaboration and integration should be strengthened between dry needling practitioners and acupuncturists so that the patients can receive safe and high-quality treatment. This can only occur with adequate training. Solutions include: sharing resources for further research and mutual benefit between the two disciplines; adequate training for anyone who uses acupuncture needles in clean-needle skills; establishment of regulations for education and training of dry needling practitioners; and establishing continuing education requirements.

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Cross-Sectional Analysis of eHealth Literacy Characteristics within Herbal Supplement Users

Nault, D., Maty, S., & Hanes, D.

BACKGROUND: As it is currently identified in the literature, eHealth Literacy (eHL) is comprised of core fundamental (CeHL) skills, as well as more advanced appraisal skills, which enable users to locate, apply, and evaluate health information found online. Current research suggests that the public regularly uses online health resources to guide their healthcare decisions, especially those who choose to use herbal dietary supplements. For this reason, it is important to identify whether herbal supplement users (HSUs) exhibit the CeHL attributes that would suggest they are able to find applicable health information online.

RESEARCH OBJECTIVE: Our primary objective was to explore CeHL attribute variables representing: general education, tech/internet familiarity, information seeking, and beneficial health behaviors, within the HSU subpopulation.

METHODS: In this analysis, CeHL attribute variables were initially identified within the National Health Interview Survey (NHIS) data via Factor Analysis. The NHIS is an annual interview survey, used to collect health data from U.S. citizens. Distribution of CeHL variables as well as logistic regressions were examined to identify the likelihood of CeHL attributes occurring among HSUs.

RESULTS: On average, HSUs were older (43.41, SD=13.17), Caucasian (86.8%), and married (57%). HSUs also report the highest group proportion engaging in preventative health care measures such as HIV testing (40.8%), tetanus vaccination (70.9%) and hepatitis (40.7%) vaccination. In all regression models, HSUs were more likely to report seeking health information and interaction with the health care system online, than non-HSUs.

CONCLUSION: When compared to others in the U.S. population, HSUs appear to show a higher likelihood of exhibiting CeHL attributes. This work suggests HSUs report having the theoretically constructed *capabilities to find and apply* online health information. However, this still indicates a need for further research on whether HSUs can correctly *appraise* the health information once found.

Cross-Sectional Analysis of eHealth Literacy Characteristics within Herbal Supplement Users

Daryl Nault, MS, MSiMR[1,2], **Siobhan Maty, PhD, MPH**[2], & **Douglas Hanes, PhD**[2]

[1]Maryland University of Integrative Health; [2]National University of Natural Medicine

Background

As it is currently identified in the literature, eHealth Literacy (eHL) is comprised of core fundamental (CeHL) skills, as well as more advanced appraisal skills, which enable users to locate, apply, and evaluate health information found online.[1,2]
We divided these six literacies into two groups (Figure 1).

CeHLs, which make up the the basic skills required to understand and utilize eHealth.[4,5]:
(1) Traditional education
(2) Computer fluency
(3) Information seeking
(4) Personal health literacy

The more cognitively advanced eHLs (AeHLs) include:
(5) Scientific appraisal
(6) Media evaluation.[1,3]

Why this matters:

- Current research suggests that the public regularly uses online health resources to guide their healthcare decisions.[6,7]
- There is concern with regards to the trust dietary supplement users place in information found online.[8,9]
- Use of non-evidence based resources to guide health decisions has the potential to harm patients.[6-9]

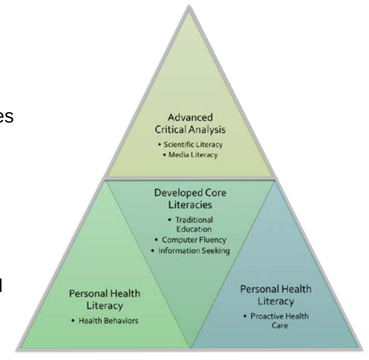

Figure 1: The complete eHL Construct, depicting CeHLs (bottom) as the basis for developing more advanced AeHLs (top).

Therefore, it is important to first identify whether herbal supplement users (HSUs) exhibit the CeHL attributes that would suggest they are able to *find* applicable health information online before assessing their capabilities or the information itself.

Research Objectives

Our primary objective was to explore CeHL attribute variables representing: general education, internet familiarity, information seeking, and health information application (personal health literacy), within the HSU subpopulation.

Methods

The National Health Interview Survey (NHIS) is an annual interview survey, used to collect health data from U.S. citizens. The total NHIS population (n=108,131) was reduced in order to accommodate inclusion/exclusion criteria of the study and identify the applicable sample set (n=31,957).

Sample size (Figure 2) was selected before distribution of CeHL variables were explored to gain a more complete picture of the sample. Distributions were followed up with both unadjusted and adjusted logistic regressions to examine the likelihood of CeHL attributes occurring among HSUs.

CeHL attribute variables were initially identified within the NHIS data via Principal Component Analysis (PCA). In PCA analysis, an underlying construct representing CeHL was identified among NHIS variables. These variables represent self-reported attributes such as: online health information seeking and health system interaction, educational status, and preventative health care behaviors (Figure 3).

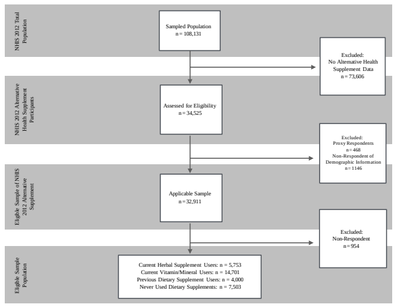

Figure 2: Study flow and sample selection for this study. Those who required proxy responses, or who did not provide response to the necessary questions, were excluded to reduce potential bias.

Results

Distribution:
Generally HSUs…

- Were on average **older** (48.39) than the mean age, primarily **Caucasian** (86.8%), **Female** (55.8%) and reported making an income **above the federal poverty level** (91.6%).
- Reported the **highest proportions engaging in preventative health care measures** such as: HIV testing (40.8%), Tetanus vaccination (70.9%) and Hepatitis (40.7%) vaccination.
- Reported **higher educational attainment** (74.2%) more frequently.
- Were **more likely to report Online Health Information seeking** (64.9%) and Health System Interaction (22%).

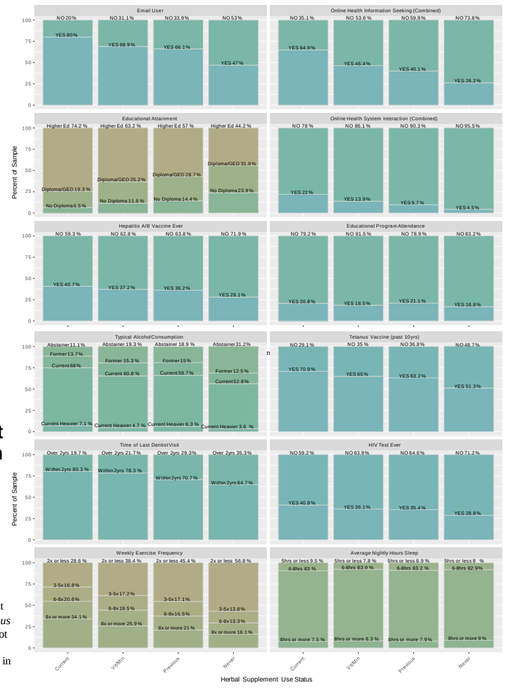

Figure 3 (right): Distribution of PCA selected CeHL attribute variables. *Current* users reported using herbal supplements within the past year. *Vit/Min* users did not use herbal supplements in the past year, but did report using vitamins/minerals. *Previous* users reported taking supplements in the past, but not within the past year. *Never* users reported never having used herbal or vitamin/mineral supplements in their life. Each panel represents a CeHL suggestive attribute identified by prior PCA.

Regression: In all regression models, HSUs were far more likely to report seeking health information (OR =2.62, 95%CI[2.43, 2.83]) and interaction with the health care system online (OR=1.89, 95%CI[1.71, 2.08]), when compared to non-HSUs (Table 1).

Table 1: Univariate and Adjusted Univariate Models, Odds Ratios, and Confidence Intervals
Indicating "Current" Herbal Supplement Users Likelihood of Reporting CeHL Attributes

CeHL Attribute Variable	OR(95%CI)	***	OR(95%CI)	***
Seeks Health Information Online *(Yes)*	2.85 (2.64, 3.08)	***	2.62 (2.43, 2.83)	***
Educational Attainment				
Diploma/GED	1.64 (1.39, 1.94)	***	1.52 (1.29, 1.80)	***
Attended Educational Program Recently *(Yes)*	1.16 (1.06, 1.28)	**	1.36 (1.22, 1.51)	***
Has been tested for HIV *(Yes)*	1.35 (1.25, 1.46)	***	1.47 (1.36, 1.60)	***
Time since last saw a dentist				
Over 2yrs	0.67 (0.61, 0.74)	***	0.83 (0.75, 0.91)	***
Abstainer	1	***	1	***
1-7 Drinks (Current)	3.13 (2.60, 3.78)	***	2.67 (2.21, 3.22)	***
Exercise Frequency (per week)				
3-5x	1.62 (1.44, 1.82)	***	1.46 (1.29, 1.65)	***
>8x	2.38 (2.14, 2.63)	***	2.22 (2.00, 2.47)	***
5 hrs or less	1	***	1	***
>8hrs	0.75 (0.62, 0.90)	**	0.73 (0.61, 0.89)	**

[a]Adjusted for Age, Gender, Race, Poverty, Health status

Conclusion

When compared to others in the U.S. population, HSUs appear to show a higher likelihood of exhibiting CeHL attributes that represent eHL constructs such as: higher traditional education, computer fluency, and health information application (personal health care literacy).

This research suggests HSUs have the theoretically constructed capabilities to find and apply online health information.

However, there still exists a need for further research on whether HSUs can correctly appraise health information once found.

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Additional Information

Curious about this poster's predecessor that covered the PCA analysis? Have further questions for me personally? Reach out: dnault@muih.edu, I'd be happy to answer any questions and provide links!

Case Report: Yoga Therapy to Self-Manage Chronic Pain and the Psychosocial-Spiritual Impacts of Posttraumatic Syringomyelia

Richards, M., & Moonaz, S.

BACKGROUND: Posttraumatic syringomyelia is a rare, intractable neurological condition that involves formation of an intra-cord cyst (known as a syrinx) and disrupted flow of cerebrospinal fluid. Surgery is a last resort and neurological medications present negative risks and side effects. This case report examines the use of applied yoga therapeutics to self-manage chronic pain and address the psychosocial-spiritual ramifications of living with an unseen, difficult-to-treat neurological condition. It highlights the impacts of observer bias on the therapeutic relationship.

CASE DESCRIPTION: The client was a 19-year-old female undergraduate student and competitive rower. She was diagnosed with a thoracic cord syrinx after months of intensifying chronic pain and disordered sleep with inhibited thoracocostal mobility that resulted in breathing difficulties. In lieu of pharmaceutical management, the client chose to participate in a short-duration, intensive course of yoga therapy to improve pain, thoracic and rib cage mobility, breath function and sleep quality. She also sought relief from sustained levels of anxiety, fear, social isolation and a sense of disconnection from her inner self. The initial plan of care, which focused on physical and breathing practices, was ineffectual at reducing the client's pain and stress levels. Reevaluation included a new program of physical and breathing exercises. However, the therapeutic focus shifted toward the energetic practices of mudra (symbolic hand gestures), mantra (silent or vocal repetition of a life-affirming phrase) and visualization, leading to improvements in physical comfort, sleep quality and self-concept.

CONCLUSION: An intensive course of comprehensive yoga therapy may offer unique opportunities to improve individuals' self-perception, self-esteem and self-advocacy. This case seems to indicate that the change in emphasis from a structural approach toward the subtle body practices of yoga therapy helped the client achieve multiple gains in quality of life. Younger clients with a chronic disease, in particular, may gain effective yoga-based tools to navigate the challenges relating to a lifelong diagnosis. Randomized controlled trials of intensive yoga therapy as an early intervention, especially with youth and young adults, to address the psychosocial-spiritual impacts of chronic pain and diagnosis of an intractable condition, are warranted.

Applied Yoga Therapy as a Self-Care Modality to Manage the Symptomatic and Psychosocial Impacts of Post-traumatic Syringomyelia

Mary E. Richards, M.S. Candidate and Steffany Moonaz, Ph.D.
Maryland University of Integrative Health

Background

What is Post-traumatic Syringomyelia?

- Rare spinal pathology that affects 8 in 100,000 persons.
- Fluid-filled cyst known as a syrinx forms within the spinal cord.[1, 2, 3] The syrinx typically expands and elongates over time, a pathological process that destroys the affected segment of the spinal cord from its center outward.[2, 3] Nearby nerve fibers are compressed and injured, which may lead to progressive weakness in the extremities; stiffness of the back, shoulders, arms and/or legs; and chronic pain.[1, 2, 3]
- May result from a number of medical conditions such as meningitis, tumor, aneurysm, disc diseases, and blunt force trauma that injures the spinal cord.[1, 2, 3, 4] There tends to be a delay between the trauma and onset of symptoms.
- Primary symptom is chronic, severe pain.

What is Yoga Therapy?

- The use of yoga practices such as physical exercises (asana), breathing exercises (pranayama), contemplative self-study, meditation and relaxation techniques (guided visualization, mudra, mantra) to educate and empower the client in self-care.

Client Information

The client is a 19-year-old female, who competes as a collegiate rower.

- At age 17, after a fall that bruised the middle back, experienced acute mid-back and right flank pain, treated satisfactorily with a 12-week course of physical therapy.
- At age 18, experienced intensifying thoracic and rib cage pain with respiratory inhibition and frequent episodes of breakthrough pain.
- Sleep pattern increasingly disrupted, with negative effects on cognitive function, self-perception and social interaction.
- In February 2016, diagnosis via MRI by board-certified neurosurgeon.
- In March 2016, sought yoga therapy to learn nonpharmaceutical self-care techniques to manage chronic pain, stress and psychosocial distress.
- In June 2016, 10-week intensive series of yoga therapy commenced.

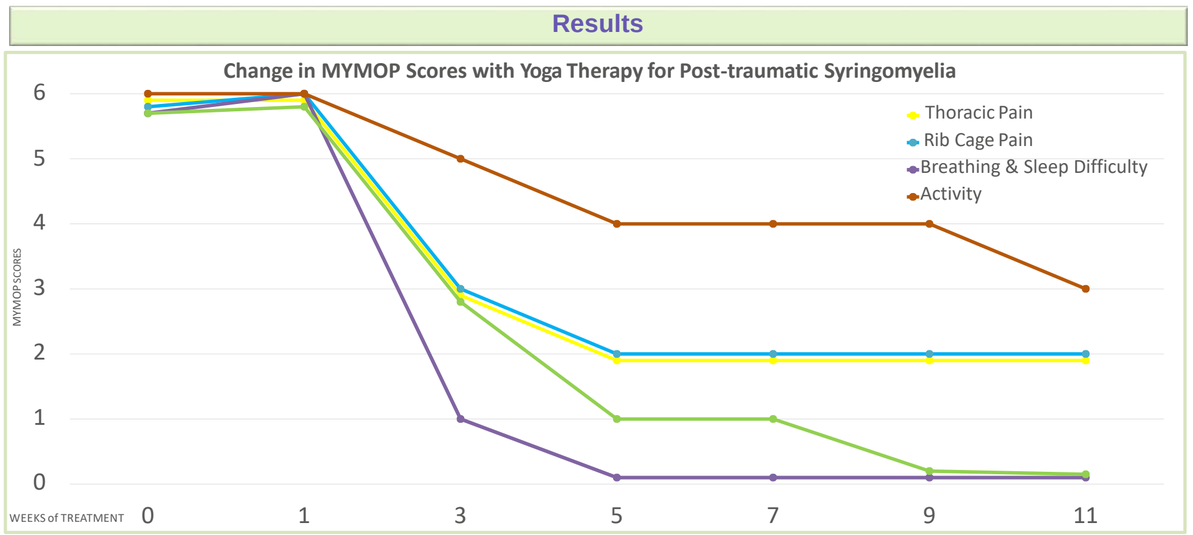
Methods

After the initial consultation in March 2016, the client reported that the plan of self-care was ineffectual in meeting her needs and goals. In June 2016, the client and yoga therapist began a 10-week series of intensive yoga therapy, which resulted in a restructured plan of self-care. The initial plan of care relied on a structural approach, to focus on physical imbalances; however, reevaluation indicated a more comprehensive approach was necessary, to address the client's burgeoning feelings of fear, anxiety, social isolation and disconnection from Self. The tables show the initial and revised plans of care.

Table 1: Initial Asana & Pranayama Series
Forearm Plank, to stabilize lumbar
Derotational Forearm Plank, to counter asymmetry of rowing
Supine Abdominal Activation with block, to stabilize lumbar
Cobra Pose with rotation, to mobilize rib cage & open chest
Hanging Downward-Facing Dog, to create space in back body
Three-Part Breath, to facilitate sleep

Table 2: Revised Asana & Pranayama Series with Mudra & Guided Visualization
Side-Chest Stretch Pose, to mobilize rib cage
Revolved Standing Wide-Angle Forward Fold, to stretch hamstrings & mobilize rib cage
Bound Half-Lunge Pose, to stretch hip flexors & open chest
Chair-Supported Downward-Facing Dog, to create space in back body
Bolster-Supported Side-Lying Position, to create space in side body
Wall-Supported Standing Side-Bending Pose, to create space in side body
Life Mudra, to connect to inner strength & increase vitality; pair with visualization of beloved oak tree at family home
Conscious Breath, to facilitate sleep (17-minute audio recording)
Staged Inhalation, to mitigate stress & pain; pair with Life Mudra (3-minute audio recording)

Results



Conclusion

The results of this case report seem to indicate that yoga therapy offers a low-barrier self-care modality to individuals seeking drug-free options for pain and stress management relating to intractable neurological conditions. In particular, investigation of the following seems warranted:

- Yoga therapy as a long-term supplementary and/or self-care option for individuals with neurological disorders to measure improvements in quality of life;
- Yoga therapy as an early intervention in pediatric and young-adult populations with neurological and chronic pain-related conditions;
- Yoga therapy as a modality to improve patient education and self-agency for individuals diagnosed with incurable or difficult-to-treat lifelong conditions.

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Yoga Therapy Pilot Study for Children with Autism: Rationale and Study Design

Searl, K., & Sullivan, M.

BACKGROUD: Autism Spectrum Disorder (ASD) is associated with behavioral deficits and anxiety. Increasing tolerance in reacting to and managing the input of new stimuli encountered daily are essential strategies to improve function in everyday life. Abnormal sensory processing may contribute to the lack of socialization and connection with others. Yoga interventions have been found to help with anxiety in ASD and to have benefits in self-regulation for psychological health. Yoga may also represent a novel modality to improve tolerance, resilience, sensory processing, socialization, and connection in ASD.

RESEARCH OBJECTIVE(S): To describe the rationale and development of a yoga therapy intervention for children with ASD, providing self-regulatory strategies to increase tolerance and better manage anxiety/panic in response to new stimuli.

METHODS: An evidence-informed protocol was developed for a population of children aged 11-14 with High Functioning Autism (HFA), IQ of 70 or greater with medical or educational diagnoses of ASD. A pilot study was developed to look at the feasibility and potential benefit of offering yoga therapy to address anxiety, tolerance to stimuli, socialization, and connection in ASD. Ten students from the Monroe County Educational Center will be enrolled. All students will receive this intervention (e.g., two times weekly for individual yoga therapy for 16 weeks with a home practice of three times weekly) with staggered start times. Outcome measurement tools to assess self-regulation for tolerance to change, self-efficacy, sleep disturbances; gross movement patterns and anxiety will be given pre, mid, and post during the sixteen week intervention time.

DISCUSSION: This study design will help to determine if yoga therapy is feasible to help develop self- regulatory tools for increased self-efficacy in children with ASD. Yoga may be a cost efficient and safe means to gain self-efficacy tools for self-regulation.

Yoga Therapy Pilot Study for Children with Autism: Rationale and Study Design

Searl K., Sullivan M.

Maryland University of Integrative Health

Background

Autism Spectrum Disorder (ASD) is associated with behavioral deficits and anxiety. Increasing tolerance in reacting to and managing the input of new stimuli encountered daily are essential components to improve function in everyday life. Abnormal sensory processing deficits may contribute to the lack of socialization and connection with others and is proposed to have correlated with low vagal tone [1]. Yoga interventions have been found to help with vagal tone [3, 4], anxiety [5] in ASD and to have benefits in self-regulation [2] for psychological health. However, no studies have addressed yoga's effects on tolerance, resilience, regulation of sensory processing, socialization and connection in those with ASD.

Research Objectives

This poster describes the rationale and development of a yoga therapy intervention for children with ASD. This study will evaluate how vagal tone and anxiety change over time in children with ASD who receive individualized yoga therapy over four months.

Table 1

Treatment Room Considerations[6]
Pick a room that has the least amount of doors and remove sharp objects
Take down or turn around loud art and remove any objects that resemble toys
Schedule appointments during oV peak times so that the child can make loud noises without disrupting otherscare
Change challenges autists have the room set-up the same for each session
Calm and serene is not the same for all individuals and autists are sensory sensitive. Is your space really sensory neutral? (e.g. strong odors, fans, bright lights, and soon)
Use Yoga mat to define personal space
Autists like predictability, structure and consistency. Teach them to take their shoes and socks oV, greet with Namaste, find the mat and sit quietly.
To lower autists anxiety consider answering these questions each time that you see them with a visual board: What am I supposed to do? What is next after the task is finished? How will I know when the task is complete?

Methods

An evidence-informed protocol designed to study the population of ten children with High Functioning Autism (HFA), (HFA is defined as those with IQ of 70 or greater) with medical or educational diagnoses of ASD between the ages of 11 and 14. A pilot study was developed to look at the feasibility which will be considered through recruitment rates and retention rates and potential benefit of offering yoga therapy to address anxiety, tolerance to stimuli, socialization, and connection in ASD. Ten students will be enrolled and recruited from a community center that serves children with ASD. All students will receive a customized session that follows the same timeline listed in Figure 1. The same yoga therapist will see the individual for yoga therapy in an in an ASD-Friendly treatment room (see table 1) two times weekly for sixteen weeks (see Figure 2 for a protocol timeline) with a three times weekly home practice. Each student will be treated individually and the research collected will be grouped together to determine outcomes. The home-based training will mirror the individual session and tracked on a journal that will be provided by the yoga therapist to the guardian of the child. Outcome measurement tools will include the use of the ABC-C, Neuro-QOL Item Bank 2.1 Pediatric Fatigue Short Form, The Journey to Wild Divine Biofeedback Software (see Table 2). These measures will be given pre, mid, and post intervention to assess self-regulation for tolerance to change, sleep disturbances, anxiety, and vagal tone.tone and anxiety will be given pre, mid, and post during the sixteen week intervention time.

Figure 2

Protocol Timeline

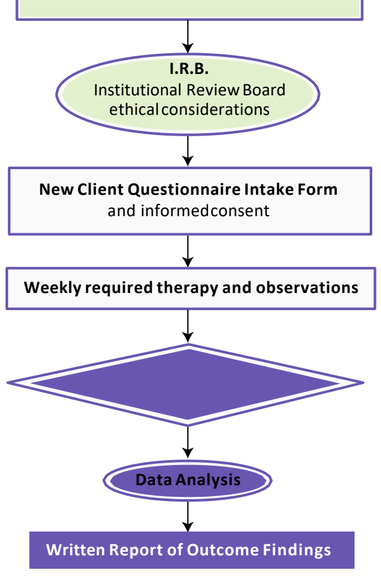

Table 2

Outcome Measurements Defined

Name of Outcome Measurement	What it measures	When it will be given
Aberrant Behavior Checklist Community (ABC-C) **Currently the gold standard in autism research.**	It is a symptom checklist (58 items) for standardized problem behavior assessing problem behaviors of children and adults with intellectual disabilities and is completed by a parent, educator or care-giver. The community version chosen here is specifically for individuals living at home. It assesses self-regulation to change, anxiety and these five sub-scales which are: **1. Irritability 2. Lethargy 3.Stereotypic behavior 4. Hyperactivity/ Noncompliance 5. Inappropriate Speech**	During the initial Intake session, Session 16 in the treatment center, Session 32 in the treatment center
Neuro-QOL Item Bank 2.1-Pediatric Fatigue-Short Form	Neuro-QOL is a set of self-report measures that assesses the health related quality of life (HRQL) of children with neurological disorders. It looks at **sleep disturbance** such as Perceptions of sleep quality, sleep depth, and restoration associated with sleep; perceived difIculties with getting to sleep or staying asleep; and perceptions of the adequacy of and satisfaction with sleep.	During the initial Intake session, Session 16 in the treatment center, Session 32 in the treatment center
The Journey to Wild Divine Biofeedback Software	The Wild Divine IOMblue (wireless and better for children who have a hard time sitting still) instrument that functions as an alternative input device for your computer software program. It acts as a connection between your physical and mental states and the wild divine software. **Their biofeedback sensor measures the body's physiology, reading, vagal tone and responding to changes in mood and stress levels.** Primary biofeedback measurement of Heart Rate Variability or Heart Coherence. Heart Rate Variability (HRV) is the variation of the intervals between heartbeats, the benefits of which are currently a leading area in medical research. It has been shown that high HRV correlates with a healthy heart, as well as increased happiness and positive emotions. Increased HRV activates the baroreceptors which regulate and optimize blood pressure, heart rate, temperature, brain function and the immune system.	During the initial Intake session, Session 16 in the treatment center, Session 32 in the treatment center

Discussion

This study will help to determine the feasibility and benefit of a yoga program for children with high functioning autism to help with anxiety, tolerance to stimuli, and tolerance to change, sleep disturbance, connection, socialization and the relationship to vagal tone. This poster describes the development of the study design to discuss critical components such as creating an ASD friendly environment, protocol development and the timeline and the identification of outcome measurement tools. If this study is promising, additional studies can be done to look at the impact of yoga for high functioning ASD and may include the use of control groups.

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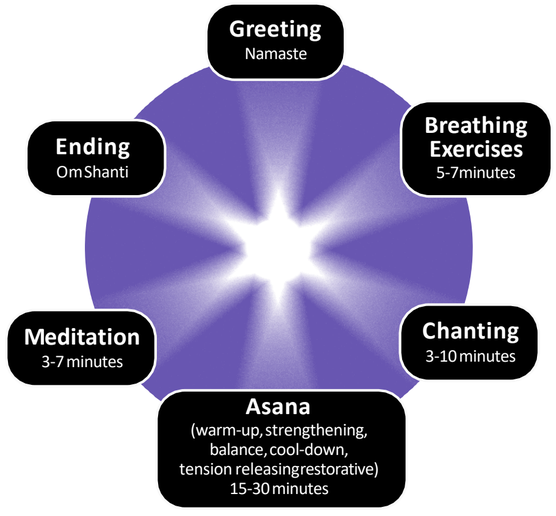
Figure 1

Intervention



A Correlational Study Examining Institutional Culture and Faculty Perceptions of Online Learning in Chiropractic Higher Education

Smith, K.

BACKGROUND: Technological advances are challenging universities to explore alternative teaching paradigms to allow students an opportunity to learn in online environments. Particularly, healthcare higher education in disciplines such as chiropractic medicine offers minimal online education, with a limited presence in online learning innovation. Awareness among higher education leadership of institutional culture and its influence on faculty perceptions of online learning aids in successful planning and implementation of strategic innovation initiatives.

RESEARCH OBJECTIVE(S): The objective of this study was to assess the relationship among collegium, bureaucracy, enterprise, and corporate institutional culture types and faculty perceptions of online learning in chiropractic higher education.

METHODS: With a relatively small total population, the purposive sampling technique was employed to select participating faculty. Data was collected by dissemination of the Faculty Perceptions of Distance Education and the Institutional Culture Model validated instruments through use of a third party web- based survey management tool. Quantitative data consisted of 131 faculty respondents from six chiropractic institutions. Pearson's *(r*), analysis of variance (ANOVA), and multiple regression statistical tests were conducted to examine plausible relationships among the variables.

RESULTS: Statistical findings determined that collegium, enterprise, corporate institutional culture, faculty age, and years working at one's current institution were not significantly related to faculty perceptions of online learning. Conversely, Pearson's (r = -.309) p = .001 and multiple regression (β = -.302, t = -3.541) p = .001 statistical test results indicated a significant relationship between bureaucracy institutional culture and faculty perceptions of online learning. Multiple regression analyses suggested gender (β = -0.206, t = -2.23) p = .028, ethnicity (β = -0.199, t = -2.15) p = .034, and employment status (β = .303, t = 3.42) p = .001 were significantly related to faculty perceptions of online learning.

CONCLUSION: Compared to all other institutional culture types, bureaucracy institution's faculty responses displayed greater negative perceptions of online learning. Female faculty was shown as more likely than male faculty to adopt innovative education technology. Non-white faculty members had significantly higher perceptions of online learning than white faculty, and full-time faculty displayed greater positive perceptions of online learning when compared to part-time faculty.

A Correlational Study Examining Institutional Culture and Faculty Perceptions of Online Learning in Chiropractic Higher Education

Keyonda M. Smith, PhD
Maryland University of Integrative Health

Background

- Technological advances challenge universities to explore alternative teaching paradigms to allow students an opportunity to learn in online environments
- Healthcare higher education in clinical disciplines, such as chiropractic medicine, offer minimal online education opportunities
- Awareness among higher education leadership of institutional culture and its influence on faculty perceptions of online learning aids in successful planning and implementation of strategic innovative initiatives (Windes & Lesht, 2014)
- This study examined the relationships between chiropractic higher education institutional culture and faculty perceptions of online learning (fig. 1)

Research Objectives

- To assess and examine the relationship among collegium, bureaucracy, enterprise, and corporate institutional culture types and faculty perceptions of online learning in chiropractic higher education
- To provide higher education leaders, of traditional institutions, recommendations and implications of faculty perceptions of online learning during planning and implementation of strategic innovative online learning initiatives

Materials & Methods

- Participating chiropractic higher education institutions (n = 6) faculty responses (n = 131) were utilized to measure McNay's collegium, bureaucracy, enterprise, and corporate institutional cultures (fig. 2)
- Data were collected by use of Totaro et al (2005) Faculty Perceptions of Distance Education and Nauffal's (2004) Institutional Culture web-based survey validated instruments
- Pearson's (r), analysis of variance (ANOVA), and multiple regression statistical tests were conducted to examine plausible relationships among the variables

Results

Figure 1: Conceptual Diagram

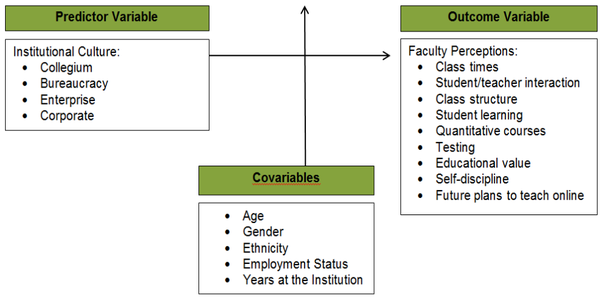


Figure 2: McNay's Models of Institutional Culture Types

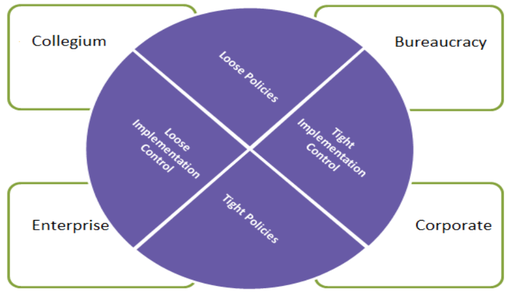
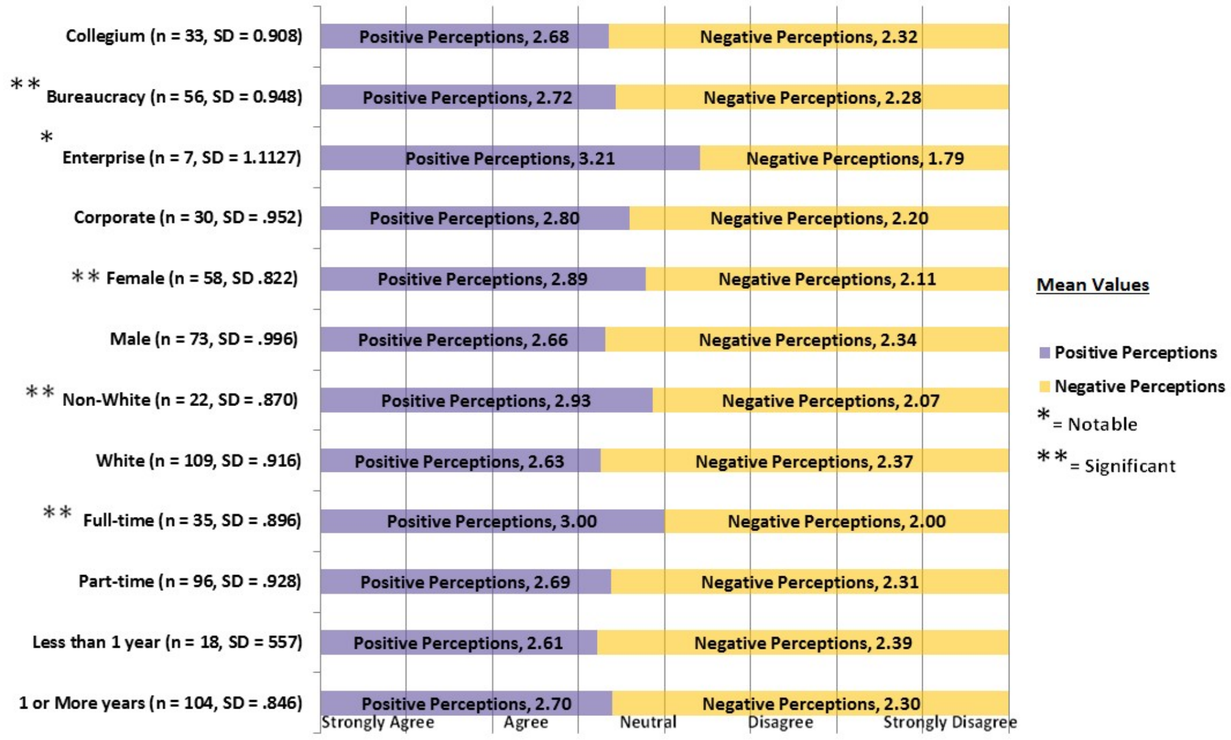


Figure 3: Perceptions of Online Learning by Variables



Conclusion

- Faculty from bureaucracy institutions displayed greater negative perceptions and faculty from enterprise institutions displayed greater positive perceptions of online learning
- Bureaucracy institutions seeking to possess a culture more closely identified with enterprise will need to place high importance on improvement by institutional restructuring, implementing enterprise-friendly policies and fostering individuals attempting to launch, manage, or progress towards an enterprise culture
- Female, non-white, and full-time faculty expressed higher perceptions of online learning
- Prevalent diversity issues faced in the industry will need to be addressed to initiate the transformation from a bureaucracy culture to an enterprise culture

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Characteristics of Yoga Therapists Currently Practicing in North America: A Cross-sectional Descriptive Survey

Sullivan, M., Leach, M., Snow, J., & Moonaz, S.

BACKGROUND: Despite advances in yoga therapy research, education and practice, little is known about the yoga therapy workforce.

Research Objective(s): To describe the personal, professional, practice, service and consumer characteristics of the North American Yoga Therapist workforce.

METHODS: Development of a 27-item yoga therapy workforce survey was informed by contemporary workforce literature and expertise of the research team. Self-identified, practicing yoga therapists residing in North America (US and Canada), who were members of the International Association of Yoga Therapists, were invited by email to participate in the e-survey.

RESULTS: 367 (7.1%) members responded. Most were aged 40-69 years (88%) and female (91%). Almost half identified as a "seasoned yoga therapist" (42%) and only a few graduated from an accredited 800-hour program. An average of 8 hours per week was spent in clinical practice with many (41%) earning an annual income of less than US $10,000 from yoga therapy practice. Twenty different styles of yoga therapy were practiced. Urban (39%) and suburban (38%) were the most common locations of practice. Both therapeutic yoga classes (91%) and 1:1 sessions (94%) were delivered with the frequency being 1-10 classes (53%) and 1-10 1:1 sessions per month (52%). The cost and duration of classes averaged US$15 for 60-75 minutes; for 1:1 sessions, it was US$80 for 60-90 minutes (initial consult) and US$75 for 60-75 minutes (follow-up). Conditions seen most frequently among clients were anxiety (77%), back/neck pain (77%) and joint pain/stiffness (67%).

CONCLUSION: While yoga therapists shared similar demographic profiles with yoga users and other complementary and integrative health (CIH) providers, they tended to work less and earn less than their CIH counterparts. Yoga therapists were less likely to work in rural settings, possibly contributing to the underutilization of yoga in underserved populations. This study highlights several obstacles facing the growth of the field of yoga therapy.

Characteristics of Yoga Therapists currently practicing in North America: A cross-sectional descriptive survey

Marlysa Sullivan[1], Matthew Leach[2],James Snow[1], Steffany Moonaz[1]

1. Maryland University of Integrative Health 2.University of South Australia

Background

Recent advances in the field of yoga therapy have influenced significant change in the discipline and workforce including:[1,2]

- Educational standards for yoga therapy training
- Accreditation of training programs
- Certification process for yoga therapists
- Scope of practice guidelines
- Code of ethics
- Growing body of yoga therapy research[3]
- Increased acceptance and use of yoga by the general public for health[4-7] and the use of yoga by the public for specific health concerns.[7-10]

Despite significant developments in yoga therapy research, education and practice little is known about the current yoga therapy workforce. Understanding the characteristics of practicing yoga therapists will help to inform the training and continuing education needs for this workforce, educational institutions and professional organizations. Insight into the characteristics of yoga therapists will also benefit health consumers and healthcare practitioners/ organizations in learning about this growing field and creating a workforce capable of meeting the needs of these groups.

Research Objectives

To describe the personal, professional, practice, service and consumer characteristics of the North American yoga therapy workforce.

Methods

- Development of a 27-item yoga therapy workforce survey was informed by the contemporary workforce literature and the expertise of the research team[11-15].
- Self-identified, practicing yoga therapists residing in North America (US and Canada), who were members of the International Association of Yoga Therapists, were invited by email to participate in the e-survey.
- Survey responses were downloaded from SurveyMonkey™ into SPSS (v.21.0) for data cleaning and statistical analysis. Partially-completed surveys were excluded from the analysis if the first two sections of the survey (i.e. at least 33% of survey items) were not completed.
- The Institutional Review Board (IRB) of the Maryland University of Integrative Health reviewed and approved the study protocol. The study was determined to be exempt from IRB oversight due to the anonymity of participants and minimal risk. All data were collected anonymously (IP addresses not recorded), and consent was implied by completion of the survey.

Results

367 (7.1%) members responded. Most were aged 40-69 years (88%) and female (91%). Many held a Bachelor or Master's degree (67%), almost half identified as a "seasoned yoga therapist" (42%) and only a few graduated from an accredited 800-hour program (9%). An average of 8 hours per week was spent in clinical practice with many (41%) earning an annual income of less than US$10,000 from yoga therapy practice.

Table 1. Professional and Practice Characteristics of Yoga Therapists (n=367)

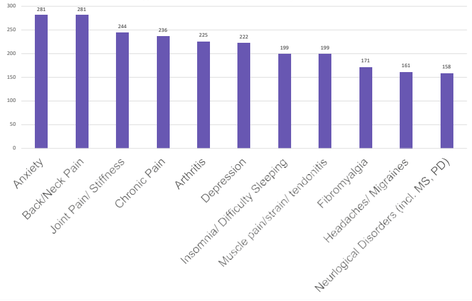
		number	%
Yoga Teacher Status	200 hour RYT or Equivalent	29	7.9
	200 hour E-RYT or equivalent	35	9.5
	500 hour RYT or equivalent	71	19.3
	500 hour E-RYT or equivalent	192	52.3
	1000 hour RYT or equivalent	2	0.5
	1000 hour E-RYT or equivalent	3	0.8
	Other training	35	9.5
	Missing	0	0.0
Additional modalities practiced[a]	Nutrition	115	31.3
	Ayurveda	106	28.9
	Aromatherapy	85	23.2
	Tactile therapies	71	19.3
	Do not use other therapies	69	18.8
	Psychotherapy	59	16.1
	Physical therapy	47	12.8
	Recreational therapy	17	4.6
	Reiki	16	4.4
	Nursing	14	3.8
	Occupational therapy	13	3.5
	Somatic therapy	11	3.0
	Other	76	20.7
Regional location of practice	Urban	144	39.2
	Suburban	140	38.1
	Rural	52	14.2
	Missing	31	8.4

[a]Multiple response question

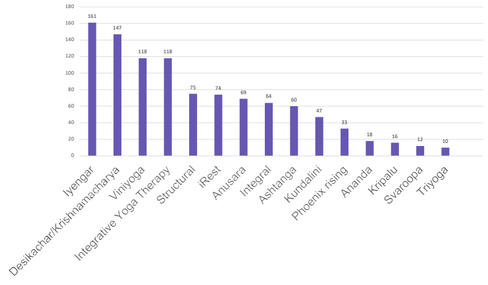
Table 2. Service Characteristics of Yoga Therapists (n=367)

		number	%
Number of 1:1 yoga therapy sessions per month	None	22	6
	1-5	111	30.2
	6-10	80	21.8
	11-15	48	13.1
	16-20	34	9.3
	21-25	22	6.0
	over 25	38	10.4
Average Fee for 1:1 Initial ($)	1-40	19	5.2
	41-50	26	7.1
	51-99	143	39
	100 or over	108	29.5
Average fee for 1:1 follow up ($)	1-40	27	7.4
	41-50	33	9
	51-99	170	46.3
	100 or over	71	19.4
Number of yoga therapy classes taught per month	None	33	9
	1-5	120	32.7
	6-10	75	20.4
	11-15	45	12.3
	16-20	26	9.8
	21-25	20	5.4
	over 25	28	10.4
Average number of people in yoga therapy class	1-5	118	32.2
	6-10	151	41.1
	11-15	43	11.7
	over 15	15	4.1
Average fee per person per class ($)	none	25	6.8
	1- 10	59	16.1
	11-20	155	42.2
	21-30	31	8.5
	over 30	58	15.8

Figure 1. Top 12 Conditions Seen by Practicing Yoga Therapists (n=367)



Yoga styles informing yoga therapy practice (n=367)



Conclusion

While yoga therapists shared similar demographic profiles with yoga users and other complementary and integrative health (CIH) providers, they tended to work less and earn less than their CIH counterparts. Yoga therapists were less likely to work in rural settings, possibly contributing to the underutilization of yoga in underserved populations. Several obstacles will need to be addressed for greater acceptance of yoga among health consumers and healthcare providers including: increasing access to yoga for underserved populations, identifying common core principles and practices in the various styles of yoga, and building a stronger evidence-base related to indications for which consumers seek yoga. These obstacles present important opportunities for yoga therapy to grow as an esteemed, evidence-informed health profession.

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Understanding North American Yoga Therapists' Attitudes, Skills and Use of Evidence-Based Practice: A Cross-National Survey

Sullivan, M., Leach, M., Snow, J., & Moonaz, S.

BACKGROUND: Little is known about the adoption of Evidence-Based Practice (EBP) by yoga therapists (YTs).

RESEARCH OBJECTIVE(S): To determine the attitudes, skills, training, use, barriers and facilitators of EBP uptake amongst a population of North American YTs.

METHODS: The Evidence-Based practice Attitude and Utilization SurvEy (EBASE) was modified for the study population. A link to the online survey was emailed and completed by self-identified North American YTs who were members of the International Association of Yoga Therapists.

RESULTS: Responses were provided by 367 (7.1%) members. Attitudes towards EBP were generally positive with more than three quarters agreeing/strongly agreeing that professional literature and research findings were useful and necessary for the day-to-day practice of yoga therapy. Most (80%) were interested in improving the skills necessary to incorporate EBP into their practice. The majority agreed that EBP improves the quality of patient care (68%), assists in making decisions (74%) and takes into account the therapist's clinical experience when making clinical decisions (59%). Moderate to moderately-high levels of perceived skill in EBP were reported with regard to EBP uptake in the past month, mostly utilizing online search engines (51%). Lack of clinical evidence was the only moderate or major barrier to uptake considered by a large proportion of YTs (48%). Other factors listed were either perceived as not a barrier or only a minor barrier. Access to online EBP education materials (70.6%), ability to download full-text journal articles (69.2%) and access to free online databases in the workplace (67.3%) were considered very useful facilitators to EBP by at least two-thirds of participants.

CONCLUSION: YTs have positive attitudes, moderate to moderately-high levels of perceived skill and moderate uptake in EBP. This puts them in line with other complementary and integrative health and allied health practitioners. Several initiatives were identified to assist in the support of the adoption and clarification of EBP.

Understanding North American Yoga Therapist's Attitudes, Skills and Use of Evidence-Based Practice: A Cross-National Survey

Marlysa Sullivan[1], Matthew Leach[2],James Snow[1], Steffany Moonaz[1]

[1]Maryland University of Integrative Health and [2]University of South Australia

Background

Evidence-based practice (EBP) is an important framework for clinical decision making and takes into consideration patient perspective, best available evidence and clinical expertise.[1-3]

The benefits of EBP include improved quality of care, patient outcomes, professional credibility, interdisciplinary collaboration, patient empowerment and clinical decision making.[1-3]

Little is known about the adoption of EBP by yoga therapists (YTs).

Research Objectives

To determine the attitudes, skills, training, use, barriers and facilitators of EBP uptake among North American YTs.

Methods

Design: Cross-sectional, descriptive survey design

Sample: Self-identified North American YTs who were members of the International Association of Yoga Therapists (IAYT).

Description of questionnaire:
The Evidence-Based practice Attitude and Utilization SurvEy (EBASE) was modified for the study population. EBASE evaluates six specific components of EBP including attitude, skill, education and training, use, barriers and facilitators of EBP.

Recruitment and procedures: A link to the online survey was emailed to potential participants

Ethics: The Maryland University of Integrative Health (MUIH) Institutional Review Board (IRB) ruled the study as exempt from IRB oversight. Participants were fully informed of the purpose of the study.

Statistical analysis: Categorical data were analysed using frequency distributions and percentages. Measures of central tendency and variability were used to describe data where values were normally distributed, and medians and the inter-quartile range (IQR) used where data were not normally distributed.

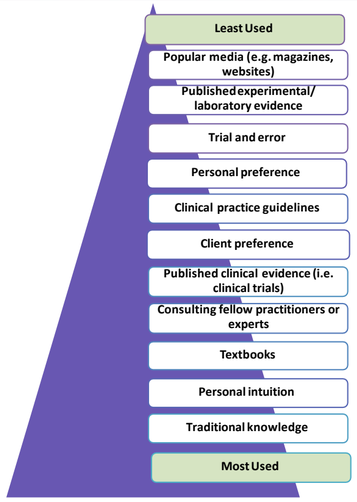
Results

367 IAYT members responded (~20% of eligible participants). Attitudes towards EBP were generally positive with 88% agreeing/strongly agreeing that peer-reviewed literature and research findings were useful and necessary for the day-to-day practice of yoga therapy. Most (80%) were interested in improving skills necessary to use EBP. The majority agreed that EBP improves the quality of patient care (68%), assists in decision-making (74%) and takes into account the therapist's clinical experience (59%). Moderate to moderately-high levels of perceived skill in EBP were reported with regard to use in the past month, mostly including online search engines (51%). Lack of clinical evidence was the only moderate or major barrier to uptake considered by a large proportion of YTs (48%). Access to online EBP education materials (70%), ability to download full-text journal articles (69%) and access to free online databases in the workplace (67%) were considered as very useful facilitators to EBP by at least two-thirds of participants.

Participant attitudes toward evidence-based practice (n=367) 1=Strongly disagree; 2= Disagree; 3= Neutral; 4 = Agree; 5=Strongly agree	Median (IQR)
*Professional literature (i.e. journals & textbooks) and research findings are useful in my day-to-day practice	4 (4,5)
*EBP assists me in making decisions about patient care	4 (3,5)
*I am interested in learning or improving the skills necessary to incorporate EBP into my practice	4 (4,5)
*EBP improves the quality of my client's care	4 (3,5)
*EBP is necessary in the practice of yoga therapy	4 (4,5)
*EBP takes into account a client's preference for treatment	3 (2,4)
*EBP takes into account my clinical experience when making clinical decisions	4 (3,4)
There is a lack of evidence from clinical trials to support most of the treatments I use in my practice	3 (2,4)
*The adoption of EBP aces an unreasonable demand on my practice [Note: Item is reverse coded]	4 (3,4)

*The sum of these items constitutes the "Attitude" subscore

Sources of information used to inform clinical decision making (n=367)



Participant self-reported skills in evidence-based practice (n=367) 1=Low; 2=Low-moderate; 3=Moderate; 4=Moderate-high; 5=High	Median (IQR)
Identifying answerable clinical questions	4 (3,4)
Identifying knowledge gaps in practice	4 (4,5)
Locating professional literature	4 (4,5)
Online database searching	4 (3,5)
Retrieving evidence	4 (3,5)
Critical appraisal of evidence	4 (3,4)
Synthesis of research evidence	4 (3,4)
Applying research evidence to patient cases	4 (3,5)
Sharing evidence with colleagues	4 (3,5)
Using findings from clinical research	4 (3,4)
Using findings from systematic reviews	3 (2,4)
Conducting systematic reviews	3 (2,4)
Conducting clinical research	2 (1,3)

Note: The sum of all of these items constitutes the "Skill" subscore

Participant use of evidence-based practice (i.e. number of times each activity was performed over the last month) (n=367)	0 n (%)	1-5 n(%)	6-10 n(%)	11-15 n(%)	16+ n(%)
I have used an online search engine to search for practice related literature or research	32 (8.7)	146 (39.8)	86 (23.4)	43 (11.7)	60 (16.3)
I have read/reviewed professional literature (i.e. professional journals & textbooks) related to my practice	15 (4.1)	169 (46.0)	88 (24.0)	43 (11.7)	52 (14.2)
I have used professional literature or research findings to assist my clinical decision making	61 (16.6)	192 (52.3)	61 (16.6)	19 (5.2)	34 (9.3)
I have read/reviewed clinical research findings related to my practice	53 (14.4)	196 (53.4)	61 (16.6)	24 (6.5)	33 (9.0)
I have used an online database to search for practice related literature or research	133 (36.2)	133 (36.2)	38 (10.4)	26 (7.1)	37 (10.1)
I have consulted a colleague or industry expert to assist my clinical decision making	88 (24.0)	198 (54.0)	46 (12.5)	14 (3.8)	21 (5.7)
I have referred to magazines, layperson / self-help books, or non-government / non-education institution websites to assist my clinical decision making	115 (31.3)	162 (44.1)	51 (13.9)	16 (4.4)	23 (6.3)
I have used professional literature or research findings to change my clinical practice	137 (37.3)	163 (44.4)	37 (10.1)	14 (3.8)	16 (4.4)

Conclusion

This study reveals that, although yoga therapy is an emerging discipline, YTs view EBP positively, are moderately prepared to engage in EBP and are participating in EBP at a moderately low level; putting them in line with other complementary and integrative health professionals.[4-6]

These findings are encouraging and suggest the readiness of the field to deliver best practice care and to be integrated into interdisciplinary and mainstream healthcare teams.

Several areas of improvement were identified for the adoption and clarification of EBP, particularly related to EBP-related skills and uptake. Facilitating improved access to yoga therapy research literature, greater investment in yoga therapy research, and the creation of innovative EBP training and education were a few initiatives identified to improve EBP for YTs.[7-8]

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Putting the Cart before the Horse: A Narrative Review of Using DNA Methods for Quality Assurance in the Herbal Supplement Industry

Tims, M.

BACKGROUND: In 2015 the New York State Attorney General attempted to establish the use of DNA barcoding methods to ensure that herbal supplement products contained the plant material listed on product labels. DNA barcoding effectively identifies animal species using a universal animal barcode. However, these types of data are absent for plants. The resulting publicity resulted in concern and confusion among consumers of herbal products.

RESEARCH OBJECTIVE(S): As applied to plant species in finished herbal products: 1) evaluate the effectiveness of using a DNA barcoding method; 2) describe published "fit for purpose" approaches.

METHODS: A literature review was conducted on primary research detailing the use of DNA methods to identify or speciate plants used in the herbal supplement industry. Additional data was used from presentations at the 2016 International Conference on the Science of Botanicals.

RESULTS: A DNA barcoding method identifies short, characteristic sequences of DNA and compares these sequences between taxa. To be useful for taxonomic differentiation, those sequence must be unique within each taxonomic subunit (e.g., species) and different between dissimilar taxonomic units. Identifying unique, universal DNA sequences for plants has not been identified. Additionally, *fit for purpose* DNA methods used to speciate plants must overcome several confounding factors, including: 1) problems in amplification of specific sequence fragments; 2) lack of variability in the chosen sequence between different plants; 3) degradation of DNA during the manufacturing process; 4) foreign organic matter (fragments of neighboring plants or microbial contaminants) found in commercial samples. Even when the technique correctly identifies the plant, DNA testing cannot identify the plant part used.
Because many of the herbs in supplements are botanical extracts, not plant material, it may be unable to identify the plant ingredients. And many of these methods currently used in the herbal supplement industry are proprietary and cannot be verified.

CONCLUSION: This review suggests that three important issues remain in developing a viable, DNA- based quality assurance tool: (1) finding appropriate sequences; (2) developing more methods that are *fit for purpose* as opposed to a one-size-fits-all approach; and (3) plant-specific DNA methods must be validated with existing, pharmacopoeial chemical analytical methods.

Putting the Cart Before the Horse: A Narrative Review of Using DNA Methods for Quality Assurance in the Herbal Supplement Industry

Dr. Michael Tims
Academic Director, Herb Program
Maryland University of Integrative Health

Background

In 2015 the New York State Attorney General attempted to establish the use of DNA barcoding methods to ensure that herbal supplement products contained the plant material listed on product labels. DNA barcoding effectively identifies animal species using a universal animal barcode. However, these types of data are absent for plants. The resulting publicity resulted in concern and confusion among consumers of herbal products.

Research Objectives

As applied to plant species in finished herbal products: 1) evaluate the effectiveness of using a DNA barcoding method; 2) describe published "fit for purpose" approaches 3) evaluate potential for "fit for purpose" DNA approaches in Quality Assurance of herbal supplements.

Methods

A literature review was conducted on primary research detailing the use of DNA methods to identify or speciate plants used in the herbal supplement industry. Databases searched include EBSCO, Agricola, Pubmed and Worldcat. Search vocabulary comprised *DNA, sequences, barcoding, genome, genetic, DNA amplification, quality assurance, species identification, herbal supplements, botanical, phytochemical fingerprinting* and *morphology*. Additional data was used from presentations at the 2016 International Conference on the Science of Botanicals/5th Interim American Society of Pharmacognosy, Oxford, MD, 2016.

Quality Assurance Requirements

1. Plant Identify
2. Plant Part Used
3. Insure no contaminants
   - Insects
   - Microbes
   - Heavy metals
   - Adulterants (chemical or plant)

3. Phytochemical fingerprint (as needed)

Results

A DNA barcoding identifies short, characteristic sequences of DNAand compares these sequences between taxa. To identify plants those sequence must be unique to differentiate species. Problems with barcoding:

- No such data for plants
- Morphologically identical plants, functionally the same species, show DNA variability due to genetic drift[1]
- Using complete sequence DNA barcoding methods, Harnly et al. able to authenticate 10% of crude raw materials, and no finished products[6]

Fit for Purpose DNA methods must overcome several confounding factors:

- Problems in amplification of specific sequence fragments
- Lack of variability in the chosen sequence between different plants
- Degradation of DNA during the manufacturing process[2]
- Foreign organic matter (fragments of neighboring plants or microbial contaminants) found in commercial samples

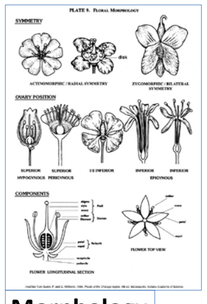
Even when the technique correctly identifies plant, *Fit for Purpose* **DNA testing cannot** identify:

- Plant part used
- Botanical extracts
- Whether grown in correct environmental conditions to produce necessary phytochemical profile
- Whether amplifying non-specific sequences, such fungal DNA, overestimates microbial load

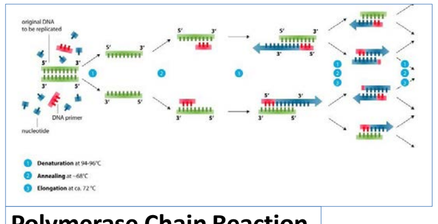
Reliable amplification using PCR demonstrated by Little[3] (for ginkgo) and Little and Jeanson[4] (saw palmetto)

Harnly et al. unable to verify herbals that lacked DNA or to characterize inert inorganic material accurately for which appropriate macroscopic, microscopic, or standard chemical tests were successful[6]

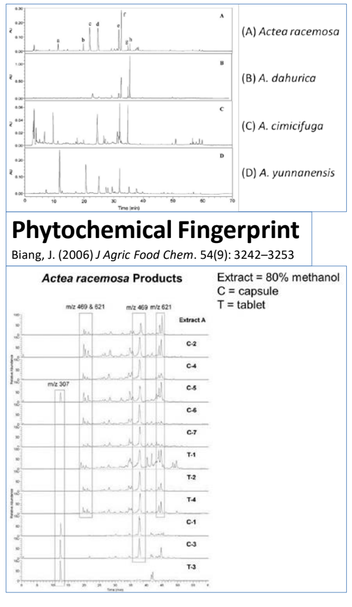
DNA Barcoding



Morphology



Polymerase Chain Reaction
Wikipedia Commons



Phytochemical Fingerprint
Biang, J. (2006) *J Agric Food Chem*. 54(9): 3242–3253

Conclusion

This review suggests several important issues remain in developing and applying DNA-based quality assurance tools:

- DNA analysis of botanical extracts is inappropriate use of the technology
- Finding appropriate plant DNA sequences
- Developing more methods that are fit for purpose as opposed to a one-size-fits-all approach
- Appropriate macroscopic, microscopic, or standard chemical tests required for QA when characterizing other than identity
- Validate plant-specific DNA tests with existing, pharmacopoeial chemical analytical methods

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The Efficacy of Magnesium on Reducing Migraine Headaches in Adults: A Literature Review

Whitaker, T., Martin, E., Simpson, L., Farmer, P., & Dixon, M.

BACKGROUND: Thirty-seven million Americans are affected with migraines. While conventional migraine treatments are effective for some patients, many physicians and patients are looking for integrative non-pharmaceutical options.

RESEARCH OBJECTIVE(S): The aim of this review was to summarize the evidence for the efficacy of oral magnesium supplements and magnesium-rich therapeutic foods in reducing migraine headaches.

METHODS: A PubMed search was conducted using MeSH terms with the search string, "adult AND migraine disorder AND magnesium." A filter of only randomized control trials was used.

RESULTS: The search returned twelve studies, only six of which were high quality and therefore included in the review. Results were screened using the SIGN Checklist for Controlled Trials. Only trials rated as "high quality" that tested the effects of magnesium against a control were used in the final review. There were 511 total participants whose results were measured in the six studies, with populations ranging from 30 to 126 patients who met migraine criteria of the International Headache Society (IHS). All studies used the IHS Scale to assess self-reported symptoms. Four of the six trials demonstrated a clinically significant effect for magnesium oral supplementation compared to placebo control in mitigating migraine symptoms. Two studies compared magnesium alone to magnesium plus standard treatment and found that magnesium was effective, but not as strong as the combined treatment. The most common effective dose was one-gram of magnesium with no significant increased benefits of higher doses. These studies measured the effects of magnesium supplements as a treatment during a migraine attack and further research is needed for magnesium as a preventative measure.

CONCLUSION: Early research suggests that magnesium may be effective in reducing migraine headaches. Along with its important functions in the body, adding magnesium-rich foods to the diet—or supplementing for acute attacks—may be a treatment option for migraine sufferers.

The Efficacy of Magnesium on Reducing Migraine Headaches in Adults: A Literature Review

Thomas Whitaker, Lynnette Simpson, Edward Martin, Pamela Farmer, Maketa Dixon

Maryland University of Integrative Health

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Background

- Thirty-seven million Americans struggle with migraines and they affect more than 1 in 4 women and are less frequent in men.[6] Migraines are described as pounding or pulsating pain that last from 4 to 72 hours.
- Most people would like to explore more natural options to relieving pain, so exploring minerals like magnesium is worth evaluating. Magnesium is one of the most important minerals needed for overall proper body function and mitochondrial health.

Methods

PICO Question: "What is the efficacy of magnesium on reducing migraines in adults?"

PubMed search using MeSH terms “adult,” “migraine disorder,” and “magnesium” as of May 15, 2016 (n=34)

Article’s language was not English (n=2)
Not Randomized Control Trial (RCTs) (n=20)

12 full-text articles assessed for eligibility (n=12)

Assessed as less than “high quality” by the SIGN Checklist for Controlled Trials (n=6)

Literatures included in review (n=6)

Research Objective

- To determine the efficacy of magnesium (Mg) on reducing migraine headaches in adults.

Results

Year / Author	Population	Exposure	Results	Conclusions
2002 Bigal et al.[1]	60 adults seen in two public health clinics	1g Mg vs Placebo	No statistical difference without aura; Mg much more effective with aura	Therapeutic gain for Mg vs placebo; effect greater with aura
2004 Cete et al.[2]	113 adults seen in an emergency room	2g Mg / Metoclopramide / Placebo	No statically significant difference between Mg, placebo, and drug	Mg and drug are not noticeably different than placebo
2001 Corbo et al.[3]	126 adults seen in an emergency room	2g Mg + Metoclopramide vs. Metoclopramide alone	Mg + drug less effective than drug alone	Mg appears to lower the effectiveness of Metoclopramide when given together
2001 Demirkaya et al.[4]	30 adults seen in a headache clinic	1g Mg vs Placebo	86.7% pain free w/ Mg after 30 min vs. 6.67% reduced pain with placebo	Mg more effective for pain relief and reduction in concurrent symptoms than placebo
2015 Gaul et al.[5]	112 adults seen in a multicenter trial	600mg nutrient combo including Mg vs. Placebo	Combo showed 75% less migraine days after 3 months of use	Combo of ingredients more effective and more well-regarded
2014 Shahrami et al.[7]	70 adults seen in an emergency room	1g Mg vs. Metoclopramide/ Dexamethasone combo	Mg 257% faster pain relief after 20 min. vs. drug combo	Mg is faster acting and more effective than drug combo

- There were 511 total participants whose results were measured in the six studies reviewed, with populations ranging from 30 to 126 patients who met criteria of the International Headache Society (IHS).
- Groups invariably consisted of a higher percentage of women than men.
- Magnesium was shown be an effective treatment versus a placebo, though not always statistically significant.
- Each of the four placebo-controlled studies exhibited that magnesium provides greater pain relief than a placebo at 30- and 60-minute intervals.

Conclusion

- Magnesium plays a critical role in more than 300 bodily processes; yet, it is estimated that as many as 75% of Americans are deficient in this mineral.[8]
- There is evidence that mitochondrial dysfunction can lead to increased migraine activity. As magnesium is essential to improved mitochondrial health, it is viewed as a substance worthy of further study.
- The results of the trials reviewed suggest that it is effective versus the most common drugs for reducing migraine headaches in adults.
- Along with its important functions in the body, adding magnesium-rich foods to the diet—or supplementing for acute attacks—warrants further study.

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