Mind, Body, Spirit, Techniques to Reduce Stress in College Freshmen

New England College Health Association

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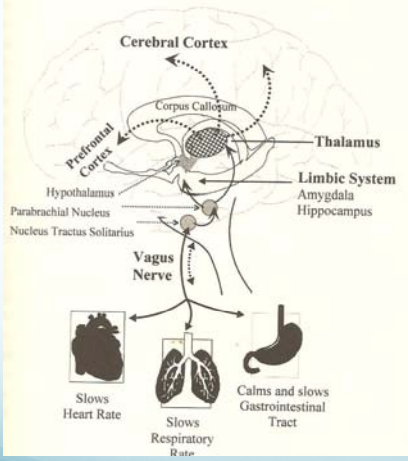
Statement of the Problem

- 80% of college students identify themselves as “moderately stressed” or “burned out” (Larson, 2006).
- Approximately 1/3 of students surveyed identified stress as the number one impediment to academic performance (Association, 2008).
- High psychosocial stress is associated with structural brain remodeling of the emotion and memory areas: such as the hippocampus, amygdala, and prefrontal cortex, subsequently resulting in memory impairment, anxiety, and increased aggression (McEwen, 2004).
- High psychological stress causes the brain to revert to a stimulus response mode of elevated sympathetic reactivity (Travis, 2009). correlated with excessive daytime sleepiness, poor night sleep quality, and deteriorations in cognitive ability (Lee, 2003).
- Stress effects can influence health directly through physiological innervations and indirectly through maladaptive health behaviors (Von Ah, 2004).
- High-stress levels, sleep disturbances, alcohol and drug use are commonly reported experiences of college students (Nguyen-Michel, 2006; Travis, 2009).
- Stress effects on brain function:
  - Creates a barrier to strengthening synaptic connections
  - Opposes cortical plasticity.
  - Causes unfavorable conditions for learning

Scientific Theory

The Hypothalamic Pituitary-adrenal Axis (HPA) & Sympathetic Nervous System generate the physical response to stressful stimuli.



- **Sympathetic dominance**: A state of hyperactivity of bodily functions, increased production of biochemicals, cortisol, & epinephrine, increased energy consumption and byproduct production of free-radicals leading to depletion of energy supplies (Brown, Gerbarg, Muskin,, 2009).
- **Parasympathetic response** Inhibition of stress hormones secretion, through stimulation of the parasympathetic nervous system and release of relaxation hormones, norepinephrine, & oxytocin from endocrine system and cytokines from immune system **and Vagal Stimulation** (pictured left)

  The vagus nerves influence alertness, attention, cognitive processes, emotion regulation, and stress response (Brown, Gerbarg, Muskin,(2009)
- Many Chronic conditions attributed to autonomic nervous system imbalances:

  autoimmune diseases, coronary heart disease, gastrointestinal disorders, chronic pain, and psychiatric conditions.

Age Related Brain Conditions

- Full development of the pre-frontal cortex, responsible for rational problem-solving and interpretation of emotional cues, occurs in the mid-20"s (Herrman, 2005).
- A greater release of stress hormones, increased level of physiologic disruption, requires additional recovery time from stressful events (Spear,2000).
- Lack of recovery results in an accentuated response to stress
  - Chronic state of stress reactivity
  - Quicker activation of the response to minor threats (McEwan, 2006).
  - May contribute to the propensity for adolescents to seek relief from substance abuse (Herrman, 2005).

Multi-System Stress Response

- Stress activates the brain, the neuroendocrine system and immune system (Gimbel, 1998).
- brain cells and nerve fibers throughout the body secrete neuro-peptides (Pert, 1997).
- The sympathetic nervous system is rapidly activated with a shorter duration in comparison to the production of cortisol, takes longer but lasts longer (Kang, 2001).
- Immune system Natural Killer (NK) cell activity is increased in the acute phase and a sustained decrease with consistent exposure (Kang, 2001).
- Stress effects on the immune system can alter cellular, humoral and innate immunity depending on the nature of the stressor and the cytokine response (Kang, Fox, 2001).
- T-helper cells stimulate and sustain the immune response, T-suppressor cells prevent over-activation of the immune system (Kang, 2001).

Meditation and Coherent Breathing Beneficial Mind/Body/Spirit Effects

- Ancient mind/body techniques, like meditation and yoga breathing have a positive effect on improving both physical and psychological well-being through adjusting the physiological response to stress (Brown & Gerbarg, 2005, Deckro, et al. 2002, Finger & Arnold, 2002).
- Yoga breathing and meditation both inhibit the secretion of stress hormones through balancing the autonomic nervous system by stimulating the parasympathetic system, releasing the relaxation hormones, to adjust for the persistent state of sympathetic dominance (Elliot, 2006).
- Emotional excitement increases the rate of breathing: voluntary slow paced breathing can be emotionally calming (Brown & Gerbarg, 2009).
- Mental health conditions, sleep disturbance, social dysfunction, and psychological distress, have shown reduction of symptoms from the practice of meditation and coherent breathing in particular
- The practice of yoga shares the underlying principle of mindfulness meditation, inducing mindful awareness. This is also the mind/body principle behind cognitive behavioral therapy, (CBT), (Smith, 2008).
- Successful outcomes of mind/body methods, include increasing one's ability to apply effective coping strategies, reducing somatic complaints, generalized distress or perceived stress, (Deckro, 2002).
- These techniques focus on developing a detached observation of the contents of one's consciousness and have the potential to provide a powerful cognitive behavioral coping strategy for transforming the manner of responding to life events (Astin, 1997).

Meditation

- Meditation has been demonstrated to reduce the arousal state and may also ameliorate the symptoms of anxiety in various anxiety conditions (Krisanaprakornkit, 2009).
- Meditation is comprised of two general types, concentrative meditation and mindfulness meditation (Krisanaprakornkit, 2009).
- Concentrative meditation developed in India approximately 3000 years ago instructs the emphasis of focusing and sustaining one's attention on an object such as a mantra, or word, until the mind achieves stillness.
- Mindfulness meditation is approximately 2,500 years old and is based on the Buddhist tradition for increasing awareness, wisdom, and the ability to live each moment of life to the fullest (Finger, 2002). Mindfulness meditation is defined by Kabat-Zinn as "paying attention in a particular way on purpose in the present moment and non-judgmentally" (Kabat-Zinn, 2002).
- After regularly practicing this technique, one develops a sustainable attentive observational capability of not reacting to thoughts and emotions. The equanimity of the mindful state assists in retraining, or deconditioning, previous poorly-adapted patterns of reacting to external reality. Mindfulness-based stress reduction programs are based on these principles (Arias, 2006; Smith, 2008; Krisanaprakornkit, 2009).

Coherent Breathing

- also referred to as "resonant breathing" a type of conscious breathing.
- the underlying principle: the relationship between emotions and the breath is based on neurological innervations (Elliot, 2006).
- Changes in the rate and depth of breathing produce changes in the quantity and type of peptides secreted by the brainstem (Pert, 1997).
- Breathing affects multiple physiological responses, cardiovascular alterations, and skin conductance evidenced through biofeedback and functional Magnetic Resonance Imaging (fMRI), (Philippot, 2002)..

Biobehavioral Nursing Theory Psycho-Neuro-Immunology

- Candace Pert identified the presence of neuropeptides and their receptors in the brain, the intestinal tract, and immune system in 1985. "Neuropeptides and their receptors thus join the brain, glands, and immune system in a network of communication between brain and body, probably representing the biochemical substrate of emotion" (Pert, 1997, p,179).
- Neuroscience, endocrinology, and immunology are joined through a multidirectional network of neuropeptides produced by the brain, glands, spleen, bone marrow, and lymph nodes. The evidence of this communication network of neuropeptides and their receptors establishes a physiological link between the body's cellular defense, healing mechanisms, endocrine system, and brain functions. The role of neuropeptides, the regulators of moods and emotions, are well known to innervate the limbic system (Gimbel, 1998).
- PNI is a theoretic framework readily applied to biobehavioral nursing research investigations. It helps to explain psychobehavioral and physiological, mind/body/spirit interactions, "an integrative paradigm for advancing both theoretical and empirical knowledge of physiological patterns that contribute to the dynamics of health" (McCain, 2005, p.320).
- This theoretical framework offers nurse researchers a valuable reference to aid in the discernment of physical and psychological processes and outcomes of the stress coping response.
- The multi-system comprehensive design of the PNI model supports the nursing philosophy that human beings are complex, multidimensional, holistic individuals (D. Kang, 2003; McCain, 2005).
- A PNI research question is one that seeks to determine the effect of stress on health outcomes.

Research Questions

1. Does daily practice of meditation or coherent breathing influence perceived stress, stress effects, and anxiety, or perceived holistic wellness in college freshmen and sophomores?
2. Will daily practice of meditation succeed in reducing perceived stress, stress effects, and anxiety in college freshmen?
3. Will daily practice of coherent breathing be successful in reducing perceived stress, stress effects, and anxiety college freshmen?
4. Will reducing stress, stress effects, and anxiety in college freshmen lead to improved perceived holistic wellness?
5. Will both intervention groups report greater effects than the control group?
6. Will both intervention groups report satisfaction with these techniques?

Program Methodology

PART I

- Recruitment of freshmen and sophomores
- Attendance at an introductory meeting,
- Complete pre-test instruments SRQ, STAI, PSS, & BMS-WCI, participant burden of ~ 40 minutes
- Random assignment to yoga breathing group
- Random assignment to meditation group
- Random assignment to control group

PART II

Control group meeting to receive reading assignment

Attendance at weekend workshop for intervention groups

Groups receive separate instruction for either coherent breathing or meditation techniques

PART III

1. Practice for 21 days, keeping log
2. Email reminder sent weekly to encourage the tracking of the daily practice log
3. Separate weekly follow-up sessions scheduled for each intervention group and control group

PART IV

- Final large group session for intervention groups and control group
- Completion of post-test instruments, SRQ, STAI, PSS, &BMS-WBCI, and collection of yoga/meditation daily practice forms
- Students receive $25 stipend upon completion

Participant flow through study

Session 1: Fall 2010
140 Volunteer Student Participants
Responding to email and meeting eligibility

Session 1: Fall 2010
Introductory Session - 30 students
Coherent Breathing n =10
Meditation n = 11
Reading n = 9

Session 2: Fall 2011
60 Volunteer Student Participants
Responding to email and meeting eligibility

Session 2: Fall 2011
Introductory Session - 25 students
Coherent Breathing n =8
Meditation n = 8
Reading n = 9

Intervention Workshops

Reading Groups
Session 1: n = 4
Session 2: n = 8
TOTAL n = 12

Coherent Breathing Group	Meditation Group	Final Pilot Study Sample
Session 1: n = 7	Session 1: n = 7	Session 1: n = 18
Session 2: n = 7	Session 2: n = 7	Session 2: n = 22
TOTAL n = 14	**TOTAL n = 14**	**TOTAL n = 40**

Gender and ethnicity of two participant groups

	Mean Age	Female	Male	Asian	Caucasian	Hispanic	Mixed
Session 1	18.2	12	6	4	13	1	0
Session 2	18.3	16	6	6	12	3	1

Comparison of group mean pre-test scores

	Pre PSS	Pre SA	Pre TA	Pre MBS-WBC
Session 1	18.9	40.1	44.6	107
Session 2	17.3	36.7	43.3	105
Combined	18.1	38.2	43.9	106

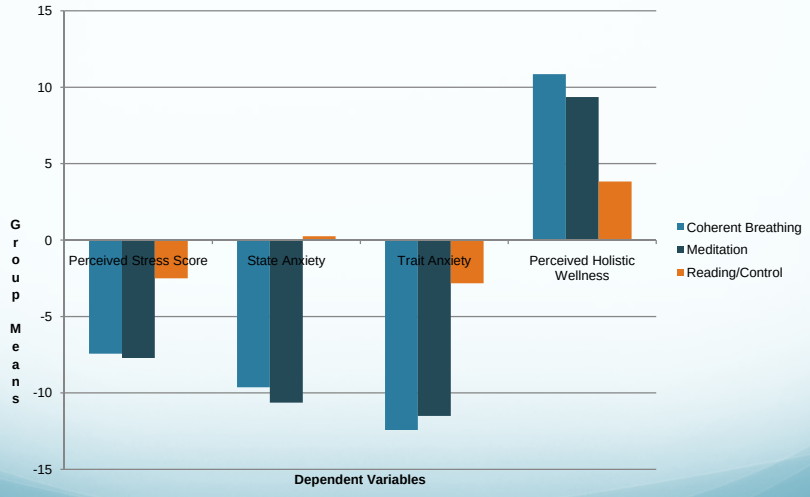
PSS, Perceived Stress Score; SA, State Anxiety; TA, Trait Anxiety; BSM, Body Spirit Mind

Gender and ethnicity of participant groups

*Groups	Gender		Total Gender	Ethnicity				Total Ethnicity
	Female	Male		Asian	Caucasian	Hispanic	Mixed	
1.00	8	6	14	4	7	2	1	14
2.00	9	5	14	1	12	1	0	14
3.00	11	1	12	5	6	1	0	12
Totals	**28**	**12**	**40**	**10**	**25**	**4**	**1**	**40**

**Group1–Coherent Breathing; Group 2–Meditation; Group 3–Reading/Control*

Results of pre-and post-test change of scores for perceived stress, state anxiety, trait anxiety and holistic wellness



Clinical Implications

- These interventions should be tested with college students who are being treated for anxiety or depression.
- They should also be evaluated as interventions for potentially reducing the number of students who engage in unhealthy risk taking behaviors. These health-risk behaviors have been identified as negatively impacting cognitive brain function (Timmins, 2002).
- a community of like-minded, health focused students who practice mind/body techniques, may create a supportive environment for reducing unhealthy coping behaviors. Research has shown that social support has a direct positive association with the practice of healthy behaviors (Von Ah, 2004).
- Opportunities presented throughout the college years have the potential to influence healthy decision-making skills with long-term health benefits (Gieck, 2007; Sidman, 2009)
- Meditation and coherent breathing may be easily implemented as treatment modalities in general primary care settings, especially through increasing numbers of practitioners with first-hand knowledge of these types of therapy
- These programs could be replicated on any college campus, expanded to other populations, and implemented as self-regulatory treatments for a variety of mental health conditions such as depression, OCD, anxiety, and sleep disorders (Shannahoff-khalsa, 2004; Arias, 2006).
- Future investigations with these biobehavioral techniques also presents nurse researchers with an opportunity for the development of interdisciplinary research teams and the potential for measuring physiologic effects with biomarkers.

Conclusions and Recommendations

- College health programming efforts may be more successful achieving positive health outcomes through initiating comprehensive approaches addressing students' mental and spiritual health needs in addition to their academic needs (Hey, 2003).
- Implementation of successful self regulatory stress management techniques may contribute to reduction of age related risk taking behaviors, injuries, and ultimately, lead to the practice of healthy lifestyle habits.
- Identifying effective stress management strategies for college students to practice would contribute to a healthy transition into young adulthood.
- Potential long term benefits include overall improved quality of life, and a potential reduction of future health care costs.
- These programs should be replicated on other college campuses and expanded to other student populations.
- Stress management techniques should be instructed to college freshmen in a mandatory life skills course.

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