



# **Dissemination of a Theory-Based Bone Health Program in Online Communities**

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# Investigative Team

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# Background: Bone Health

- ~10 million Americans age 50 and older have osteoporosis (8 million women).
- **Multiple effective measures** to improve and maintain bone density and prevent fractures have been identified.
- Only **3–23%** of adults at high risk for osteoporosis have received a BMD test, and **11–44 %** take calcium and vitamin D supplements.
- More research is needed to **identify effective dissemination strategies** in the field of bone health.
- **The Internet, an excellent dissemination medium,** can be an effective tool in this endeavor.

# Background:

## *Dissemination & Implementation (D&I)*

“Dissemination” in our study emphasizes a mechanism that will package and deliver resources to target populations and encourage them to make positive changes in specific health behaviors.

→ How to package and deliver the online intervention at the individual level?

### **Theory-Based Approach**

→ How to assess the outcomes of the dissemination study?

### **REAIM Framework**

# Background:

## *Dissemination & Implementation (D&I)*

- **The RE-AIM framework** (Reach, Effectiveness, Adoption, Implementation, and Maintenance)
    - Conceptualizes the impact of an intervention **beyond an assessment of its effectiveness/efficacy**.
    - Assess additional benefits of online interventions targeting large numbers of individuals.
- <http://cancercontrol.cancer.gov/is/reaim/index.html>

# RE-AIM: D&I Framework in Online Trials

Dimension	Research Plan	Modified RE-AIM for Online Study
Reach	<ul style="list-style-type: none"> <li>• <b>How and whom to reach?</b></li> </ul>	The number of individuals reached will be more meaningful than the proportions.
Effectiveness	<ul style="list-style-type: none"> <li>• <b>What outcomes?</b></li> </ul>	Effectiveness of an intervention
Adoption	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	Not applicable in this study because the recruitment sites were selected based on convenience.
Implementation	<ul style="list-style-type: none"> <li>• <b>Individual level:</b> SCT approach</li> <li>• <b>Fidelity plans</b></li> </ul>	Individual's usage of the intervention and perceived usability (uniform interventions are provided to both settings).
Maintenance	<ul style="list-style-type: none"> <li>• <b>8-wk vs. 12-mo</b> Intervention</li> </ul>	Long-term effects of an intervention on individuals

# Study Aim

- To examine the impact of two social cognitive theory based online bone health programs on the **RE-AIM dimensions** among older adults (> 50 yrs) recruited from two large online communities
  - (1) **An 8-week Bone Power** program
  - (2) **A 12-month Bone Power Plus** program:
    - The Bone Power program followed by bi-weekly theory-based eNewsletters for 10 months

# Design

- A three-arm RCT with five observations (baseline, 8 weeks, 6, 12, and 18 months)
- Data collection: Online surveys
- **Interventions:**
  - (1) 8-week Bone Power program
  - (2) 12-month Plus program:  
8-week Bone Power program followed by bi-weekly eNewsletters for 10 months
  - (3) Control group: No intervention



# Interventions

# Theory-Based Online **Bone Power** Program

## Platform

- Online learning management program as the overarching infrastructure (Blackboard)
- Web pages

## Program Components:

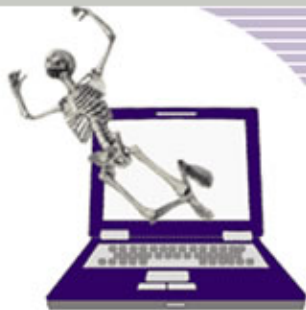
- Learning modules/Self assessment quizzes
- Discussion boards
- Ask-the-Experts
- Video lectures
- Virtual libraries
- Toolkit
- Theory-based eHealth newsletters

# Theory-Driven Online Health Programs

- **Social Cognitive Theory:** Guiding framework for the development and implementation of the study
  - Goal setting
  - Motivation
  - Outcomes expectation (OE)
  - Self-efficacy (SE)
    - \* Mastery experience
    - \* Vicarious experiences
    - \* Verbal persuasion
    - \* Physiological and emotional states



# Application of **SCT** in the Trial

- Development of the Bone Power program based on SCT.
- Use of a small group approach (~20 per group)
- Deployment of a learning module(s) with an accompanying discussion forum each week
- Moderated discussion boards based on SCT



# Bone Power

## Login Here

 [Change Text Size](#) |  [High Contrast Setting](#)

Username:

Password:

Login

### **The username and password are the same.**

Welcome to the Bone Health Study ("Bone Power") website. This program was developed by a group of multidisciplinary healthcare professionals and researchers from the University of Maryland Schools of Nursing and Medicine and from the Johns Hopkins School of Medicine. This study is supported by the National Institutes of Health.

If you have any questions or comments, please call us toll-free at [1-866-902-6563](tel:1-866-902-6563) or send an email to [bonepower@son.umaryland.edu](mailto:bonepower@son.umaryland.edu).



^ Bone Power Home\_a >>

Home Page / Welcome

Instructions / Help

Learning Schedule

Learning Modules

Discussion Board

Ask the Experts

Virtual Library

Video Lecture Library

Toolkit

Glossary

Credits/Disclaimer/Privacy

Contact Us



## Learning Modules



### Instructions

Please check off the “Mark reviewed” button when you complete reviewing the module. Thank you.



### Module 1: Osteoporosis Overview

Reviewed



### Module 2: Importance of Bone Health

Reviewed



### Module 3a: Calcium

Reviewed



### Module3b: Vitamin D


Reviewed



### Module 4: Falls

My Institution Courses **Community** My One Card Account

Bone Power Home Learning Modules > Module 1: Osteoporosis Overview



My Institution Courses **Community** My One Card Account


Bone Power Home Learning Modules > Module 3: Calcium

### Calcium Physiology

Calcium is absorbed in the small intestine both passively and actively. The active mechanism **needs vitamin D** in order to work. Although vitamin D is necessary for the absorption of calcium, it does not need to be taken at the same time as a calcium supplement. Chewable and liquid calcium **supplements** dissolve well because they break down before entering the stomach.

The body cannot absorb more than 600mg of calcium at a time.

Calcium, whether from diet or supplements, is best absorbed when taken in amounts of 500-600mg or less. **Your body does not absorb more than about 600mg at a time. If you are taking 1200mg a day of calcium you must split the dose in order for the calcium to be most effective.**



Try to get your calcium-rich foods and/or supplements in smaller amounts throughout the day, preferably with a meal. Many calcium supplements should be taken with food. One example is the supplement, calcium carbonate. Eating food produces stomach acid that helps your body to absorb calcium. Supplements of calcium citrate can be taken at any

- Learning Schedule
- Learning Modules
- Discussion Board
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- eHealth Newsletter

- Forum
- Module 1 – Osteoporosis**
- Module 2 – Importance of Bone Health**
- Module 3a – Calcium**
- Module 3b – Vitamin D**
- Module 4 – Falls**
- Module 5 – Physical Activity and Exercise**
- Module 6 – Osteoporosis Treatment**
- Module 7 – Medicine Safety**
- Module 8 – Osteoporosis and Fractures**
- Module 9 – Balanced Diet**
- Module 10a – Effects of Smoking**
- Module 10b – Quit Smoking**

<input type="checkbox"/>	<a href="#">Discussion Topic 2: Screening and Diagnosis (click here)</a>	Admin BoneHealth	6/9/11 2:41 PM
<input type="checkbox"/>	<a href="#">-RE: Discussion Topic 2: Screening and Diagnosis (click here)</a>	Participant 887	7/2/11 2:05 AM
<input type="checkbox"/>	<a href="#">-RE: Discussion Topic 2: Screening and Diagnosis (click here)</a>	Admin BoneHealth	7/3/11 12:22 PM
<input type="checkbox"/>	<a href="#">-RE: Discussion Topic 2: Screening and Diagnosis (click here)</a>	Participant 944	7/3/11 9:14 PM
<input type="checkbox"/>	<a href="#">RE: Discussion Topic 2: Screening and Diagnosis (click here)</a>	Admin BoneHealth	7/4/11 8:45 PM
<input type="checkbox"/>	<a href="#">-RE: Discussion Topic 2: Screening and Diagnosis (click here)</a>	Participant 947	6/30/11 1:42 AM
<input type="checkbox"/>	<a href="#">RE: Discussion Topic 2: Screening and Diagnosis (click here)</a>	Admin BoneHealth	6/30/11 11:39 AM
<input type="checkbox"/>	<a href="#">-RE: Discussion Topic 2: Screening and Diagnosis (click here)</a>	Participant 950	6/28/11 4:50 PM
<input type="checkbox"/>	<a href="#">RE: Discussion Topic 2: Screening and Diagnosis (click here)</a>	Admin BoneHealth	6/29/11 11:21 AM
<input type="checkbox"/>	<a href="#">Discussion Topic 1: Prevention (click here)</a>	Admin BoneHealth	6/9/11 2:41 PM
<input type="checkbox"/>	<a href="#">-RE: Discussion Topic 1: Prevention (click here)</a>	Participant 888	7/4/11 10:20 AM
<input type="checkbox"/>	<a href="#">RE: Discussion Topic 1: Prevention (click here)</a>	Admin BoneHealth	7/4/11 8:40 PM
<input type="checkbox"/>	<a href="#">-RE: Discussion Topic 1: Prevention (click here)</a>	Participant 944	7/3/11 9:06 PM
<input type="checkbox"/>	<a href="#">RE: Discussion Topic 1: Prevention (click here)</a>	Admin BoneHealth	7/4/11 8:38 PM

Total Participants
11
7
7
6
5
6

<b>Module 6 – Osteoporosis Treatment</b>	<b>Click the link to the left to join in the discussion.</b>	8	<u>8</u>	4
<b>Module 7 – Medicine Safety</b>	<b>Click the link to the left to join in the discussion.</b>	17	<u>17</u>	5
<b>Module 8 – Osteoporosis and Fractures</b>	<b>Click the link to the left to join in the discussion.</b>	6	<u>6</u>	2
<b>Module 9 – Balanced Diet</b>	<b>Click the link to the left to join in the discussion.</b>	5	<u>5</u>	2
<b>Module 10a – Effects of Smoking</b>	<b>Click the link to the left to join in the discussion.</b>	2	<u>2</u>	1
<b>Module 10b – Quit Smoking</b>	<b>Click the link to the left to join in the discussion.</b>	2	<u>2</u>	1



The content below is outside of the Blackboard Learn environment.

## Expert Videos



### Module 1 – Osteoporosis Overview

#### How to use the FRAX® tool

Dr. Michele Bellantoni

[Click here to watch](#), [Transcript](#)

Runtime: 9 minutes



### Module 1 – Osteoporosis Overview

#### Demonstration of a BMD test

Dr. Michele Bellantoni

[Click here to watch](#), [Transcript](#)

Runtime: 6 minutes



### Module 2 – Importance of Bone Health

#### Overcoming barriers to exercise

Dr. Barbara Resnick

[Click here to watch](#), [Transcript](#)

Runtime: 5 minutes

The content below is outside of the Blackboard Learn environment.


## Toolkit



Welcome to the Toolkit section of the Bone Power web site! A tool is something that can help you assess your situation or achieve a goal. Many tools are interactive and require you to fill in your information. Tools can be fun to use!

Here we have compiled a list of tools, by category, you may have seen in the learning modules you've been viewing.

Below you will see a link for a category. Click on the subject you're interested in, to go to a list of tools related to that

subject. Once there, click on the  icon to go to the tool.

[Activity/Exercise](#)

[Balanced Diet](#)

[Drinking/Smoking](#)

[Fall/Fracture](#)

[Medicine Safety](#)



# Bone Power Newsletter

Issue#4

## Introduction

Welcome to the 4th issue of our Bone Power Newsletter. We hope that you are doing well with your health goals. Staying on your exercise and diet plans may not be easy, but the important thing is to keep working at it!

## Featured Health Topic

### Arthritis and Exercise

Regular, moderate exercise is important for managing arthritis. Exercise reduces joint pain and stiffness, and strengthens muscles and bones. If you choose water exercise, keep in mind that

## Did You Know...

### About the Benefits of Aqua-Exercise?

Exercise in a pool is great, especially if you have arthritis. Warm water helps to stretch your muscles gently. Water supports your weight, so there is less stress on your joints. Water also provides 12 times the resistance of air, so you get a good muscle strengthening workout as you move. To read more, click [here](#).

## Your Health Goals

Please let us know about your progress on your health goals by clicking [here](#).

you also need weight-bearing exercises, like walking to help build stronger bones. Even five minutes of walking three times a day is a good start. Remember to discuss your exercise plan with your provider, who can prescribe a safe exercise program designed to fit your needs. To learn more, click [here](#).

## Bone Health Recipe

### Veggie-Cheese Sandwich (Calcium 200mg)



Here is a recipe for a delicious and protein-packed sandwich to enjoy after your exercise is done.

To view the recipe, click [here](#).

## Featured Bone Health Tool

### Hand Exercises for People with Arthritis

This slide show, developed by Mayo Clinic, shows how to do hand exercises for people with arthritis.

To view the slides, click [here](#) (this will lead to MayoClinic.com).

## Success Story!



From participant R. S., age 55

"Thanks for all your information. I am working with the military people and I am losing weight by walking 1-2 miles a day. I have also reduced the need for some of my medication."

Please email us at [bonepower@son.umaryland.edu](mailto:bonepower@son.umaryland.edu) with your success story.

# Sample/ Settings/ Recruitment

- Settings
  - *MyHealthVet and SeniorNet*
- Sample
  - Age  $\geq 50$  yrs
  - Access to the Internet/e-mail
  - Able to use the Internet/e-mail independently
  - Able to read and write English
  - Reside in a community setting in the U. S.
- Recruitment: 11/30/2010 – 7/6/2011
  - A total of 866 participants (mean age:  $62.8 \pm 8.5$  )
  - ~ 60 participants were randomized into 3 groups
  - 48 groups (32 separate web intervention sites)

# Procedures

- A cohort of approx. 60 participants
- Baseline survey
- Randomization (Bone Power; Bone Power Plus; Control)
- 8-week Online Bone Power program
- 8-week follow up survey
- Bone Power Plus group: Biweekly eHealth newsletter for 10 months
- 6-month follow-up survey
- 12-month follow-up survey
- 18-month follow-up survey
- Control group – Receive Bone Power CD-ROM

# Fidelity Monitoring of the Intervention

<b>Tx Fidelity Monitoring area</b>	<b>Plan</b>
<b>Delivery of treatment</b>	Access to the program website
<b>Receipt of treatment</b>	Program usage / Knowledge assessment
<b>Enactment of Tx skills</b>	Changes in behaviors

# **Selected Findings**

# Retention / Fidelity Monitoring

- Attrition rates
  - 8 wks, 18.6%; 6 mos, 19.9%; 18 mos, 19.3%
- Fidelity monitoring of the intervention
  - All intervention group participants (100%) logged onto the Bone Power website.
  - 74.2% reviewed five or more modules.
  - On average, 63% of participants in each group reviewed the new learning content weekly during the first four weeks (Bone Power core modules).

# Major Outcomes: Effectiveness

- At 8 weeks, the Bone Power group showed significantly greater improvement as compared to the control group on all selected outcomes.
- At 18 months, the effects of the Bone Power intervention decreased.
  - With the booster, the effects were still significant in osteoporosis knowledge and calcium self-efficacy.
  - Without the booster, the effects were significant in osteoporosis knowledge and calcium self-efficacy /outcome expectations.
  - Overall, there was no significant difference between the intervention conditions.



# Implementation: Lessons Learned

- Theory-based approach and use of small groups
  - An effective structure to follow-up on participants' activities over time
- Content management in a multi-year online health behavioral trial
  - Changes in external links to other credible other health websites
  - Changes in federal health guidelines (e.g., food pyramid)
  - => Continuous checking and sign up for website update service
- Intervention development and management
  - Importance of usability testing
  - Consider the program's technical compatibility with participants' computer and Internet set up.

# Implementation: Lessons Learned

- Use of an online learning management program
  - An online learning management program (e.g., BB) can be an efficient tool to conduct large scale, multi-group intervention trials.
    - Easy duplication of intervention programs
    - Pre-scheduled release dates
    - Broadcasting announcement
- Communication with participants
  - Availability of a toll-free number for questions and technical support has shown to be important in online trials, especially for older adult participants.
  - Challenges associated with e-mail communication
    - Follow up with participants via phone when they do not receive responses via e-mail.

# Conclusion

- Focus of health care is shifting from disease management to disease prevention and health maintenance.
- Findings suggest a significant potential for using online programs to improve the health of this population.
- Further research of online booster interventions will offer opportunities to develop more robust online behavioral interventions.