Using Technology for Prevention in Defined Populations: Body Image, Obesity and Eating Disorders
Thanks:
1. To the many amazing women and men I have had a chance to work with over my career

2. To my mentors: Jack Farquhar, Stewart Agras, Nat Maccoby, Helena Kraemer, Al Bandura

2. To the more than 10,000 people have graciously signed up for these studies

3. To NIMH, NIDDK, NHLBI, NICHD, The McKnight Foundation and many others who have helped fund this work
The Dream:
To provide *universal*, *targeted/selected* (those at risk) and *indicated* (those in need) to defined populations

A defined population shares a common characteristic (geography, site of selection, problem)

Technology is a means to the end
Two areas of research will illustrate the approach:

1. Eating Disorder prevention/treatment for all female students on college campuses

2. Healthy weight/regulation/ eating disorder prevention for all 9th grade students in a high school
Chapter 1
Origins: The Five-City Project
Chapter 1
Origins: The Five-City Project
The FCP: Some Lessons Learned

Media/community organization can reduce risk factors across a population


But secular trends are very powerful

Fortmann SP & Varady AN. AmJEpidemiol 2000; 152: 316, 1999
Winkleby et al:. AJPH, 86, 1773, 1996.

And the issues related to addressing whole populations are daunting, including lack of resources, focus and difficult to measure outcomes

Better to focus on defined populations
The Defined Population (e.g. all 9th grade students in a school) for a Universal and Targeted School-based Program:

All students in The school
The Reach Within a School of an Internet Program Provided On-line Independent of School:

- e.g. a program available to the 1.8 million California teens, ages 13-15
- Reports 20,000 Users but only reaches 1% of the at risk population in a “defined population”, such as a high school
The Reach of Our Programs Within a Defined Population (all 9th /10th grade students in a school):
I decided to focus on defined populations:

Early work:
- All smokers admitted to a hospital
- Post MI populations
- Anxiety Disorders

And the focus of this talk:
- Prevention/treatment of eating disorders among college women and adolescents
- Healthy weight regulation/maintenance among 9th grade students
Chapter 2. A quick Digression:
Early Efforts with Technology

What is Technology: The use of software programs and running on hardware and the data collected

Potential:

Standardized delivery
Reach large populations at reduced cost
Rapidly adaptable
Portable—take your therapist with you

But in 1980, there were not readily available hand-held computers
So We Built one:

We developed a series of programs for hand-held computers and they worked

For Weight Loss:
Burnett et al JCCP; 53: 698,

For Panic:
Newman et al, JCCP 65, 178, 1997
Kenardy et al JCCP 71, 1068, 2003

For Social Phobia:
Gruber et al Beh Ther 32, 155, 2001

For Generalized Anxiety Disorder:
Newman et al Beh Mod 23, 598, 1999
But nobody used them 😞

Why?

Failure to look at the context of use
--Still a problem with apps

Failure to consider sustainability

But old technology is not necessarily bad technology:

Soon to appear: the PennState/Stanford Anxiety Self-help Coach app (based on our hand-held computer GAD programs)
Chapter 3. Meanwhile, I got interesting in eating disorder prevention

Why eating disorders?

--Common problems

--Prevention is better than treatment

--Risk factors are well known
Prevalence of Low, Risk, High Risk, Subclinical-Clinical Eating disorders in a University Female Population

- Low Risk: 45-50%
- High Risk: 35-45%
- Clinical: 2-4%
- Very High Risk Subclinical: 10-15%

From:
- Taylor et al, Arch Gen Psych 2006, 63;831
- Jacobi et al, Psych Med, 31;1; 2011
- Drewnowski et al, Am J Psych, 1994;151;1217
We developed a “course” for 6th-7th grade female students.

And then along came the Internet

**Intervention**

- Internet-delivered

- Derived from CBT interventions for:
  - Improved body image
  - Healthy weight regulation
  - Binge eating control

- 8 sessions, with different weekly topics

- Moderated asynchronous discussion group

- Assigned, brief readings; participants expected to write about reading in personal journal and discuss on-line

- Body-image journal

- Boster session at one year (students encouraged to review; server on-line for one week)
Psychoeducation

What Are Eating Disorders?

Jaime´s Story / Angela´s Story

Learn More About:

- Dieting to the Extreme
- Binge Eating Disorders
- Bulimia
- Anorexia
Personal & Interactive

New Goals Journal Entry

Session: Session 5

Topic: My goal for getting physical activity this week

My Goals:
I will ride my bike after school for 30 minutes on Monday and Wednesday. The other days, I will go to swim practice.

SAVE THIS ENTRY

Last Night
From: demostudent
Date: January 30, 2001 at 8:06 a.m.

Find a discussion: Student Demo Group ◄ GO ◄ REPLY ◄ EDIT ◄ DELETE ◄ NEW
# Discussion Group

## Student Demo Group

<table>
<thead>
<tr>
<th>Topic</th>
<th>Author</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thursday Morning (Just Sharing)</td>
<td>demostudent</td>
<td>8/23/01</td>
</tr>
<tr>
<td>What a day! (Want Feedback)</td>
<td>demostudent</td>
<td>3/14/01</td>
</tr>
<tr>
<td>Testing (Just Sharing)</td>
<td>Bret</td>
<td>1/19/01</td>
</tr>
<tr>
<td>Last Night (Want Feedback)</td>
<td>demostudent</td>
<td>1/18/01</td>
</tr>
<tr>
<td>Re: Last Night (Want Feedback)</td>
<td>demostudent</td>
<td>1/19/01</td>
</tr>
<tr>
<td>Re: Re: Last Night (Want Feedback)</td>
<td>Bret</td>
<td>1/27/01</td>
</tr>
<tr>
<td>Re: Re: Re: Last Night (Just Sharing)</td>
<td>keiko</td>
<td>3/8/01</td>
</tr>
</tbody>
</table>

**Last Night**

From: **demostudent**  
Date: January 18, 2001 at 8:06 a.m.
Participants

- N = 480 College Age Women
- Caucasian 60%; Asian 17%; Hispanic 10%; African-American 2%; and other/unknown 11%
- Freshman 31%; Sophomore 21%; Junior 22%; Senior 18%; and Graduate 8%
- Average Age = 20.8 (range = 17-30)
- Average BMI = 23.7 (range = 18-32)

Taylor et al. Prevention of Eating Disorders in At-risk College-Age Women, Arch Gen Psychiatry, 2006, 63, 831.
Log-ons by Time of Day

Number of messages

Time of Day

0 0 0 0 0 0 0 0 0 0
12 2 4 6 8 10 12 2 4 6 8 10

Log-ons by Time of Day
Survival as a non-case for students with BMI > 25 at baseline
Survival as a non-case for students with low-level compensatory behaviors at baseline
Summary of Student Body Adolescent Eating Disorder Prevention Studies

*Consistent effect for reducing weight and shape concerns; less impact on behaviors in adolescents

*Universal and targeted programs, driven by algorithm can be provided simultaneously
  Abascal et al IJED 35, 4, 2004
  Luce et al IJED 37, 220, 2005

*Similar effect when conducted at other universities
  Low et al ED 14, 17, 2006

*Similar effects when translated and provided in German
  Beinter et al Eur Rev Eat Dis 2012;20:1
Goal:

Develop an internet-based program that:

(1) Achieves pre-determined universal, targeted/selected, indicated outcomes in defined populations (all college and universities students)

- **Universal**: Healthy Weight Regulation/
  Positive body image (self and culture)
- **Targeted/Selected**: Reduces onset of EDs,
  symptom progression those at risk
- **Indicated**: Reduces symptoms

(2) Is easy to disseminate

(3) Is widely used (most colleges and universities)

(4) Reduces the **incidence** and **prevalence** of EDs
Collaborators
Healthy Body Image Model:

Screening Algorithm: Stanford-Washington University ED Screen
Healthy Body Image Model:

Screening Algorithm: Stanford-Washington University ED Screen

High risk for ED
WCS > 45
ED screen --

Assigned to on-line targeted ED prevention Program (StudentBodies)

*Taylor et al Arch Gen Psych 2006; 63:831
Healthy Body Image Model:

Screening Algorithm: Stanford-Washington University ED Screen

- **High risk for ED**
  - WCS > 45
  - ED screen
  - Assigned to on-line targeted ED prevention Program (StudentBodies)

- **Clinical ED (DSM V)**
  - No AN
  - Stable
  - No SI
  - Assigned to on-line indicated ED RX Program (StudentBodies+)

- **Clinical ED (DSM V)**
  - AN
  - Unstable
  - No SI
  - Prefer
  - Referral for In-person eval, rx

Healthy Body Image Model:

Screening Algorithm: Stanford-Washington University ED Screen

- **Low risk for ED**
  - WCS < 45
  - Screen --
  - Assigned to online universal Healthy weight regulation/body Image program (StayingFit)*

- **High risk for ED**
  - WCS > 45
  - ED screen --
  - Assigned to online targeted ED prevention Program (StudentBodies)

- **Clinical ED (DSM V)**
  - No AN
  - Stable No SI
  - Assigned to online indicated ED RX Program (StudentBodies+)

- **Clinical ED (DSM V)**
  - AN
  - Unstable No SI
  - Prefer
  - Referral for In-person eval, rx

*Taylor et al, Int J of Obesity, in press
Healthy Body Image Model: Two dimensional model

Screening Algorithm: Stanford-Washington University ED Screen

- **Overweight Obese, No ED**
  - Assigned to online universal Healthy weight regulation/body Image program (StayingFit)
  - Assigned to weight maintenance Loss program (SB-Weight)*

- **Low risk for ED WCS < 45 Screen**
  - Assigned to online targeted ED prevention Program (StudentBodies)

- **High risk for ED WCS > 45 ED screen**
  - Assigned to online indicated ED RX Program (StudentBodies+)

- **Clinical ED (DSM V) No AN Stable No SI**
  - Prefer
  - Referral for In-person eval, rx

- **Clinical ED (DSM V) AN Unstable No SI**

Healthy Body Image Model: Follow-up

- Assigned to weight maintenance Loss program (SB-Weight)
- Assigned to online universal Healthy weight regulation/body Image program (StayingFit)
- Assigned to online targeted ED prevention Program (StudentBodies)
- Assigned to online indicated ED RX Program (StudentBodies+)

50% symptom Reduction by Mid-Intervention

- Yes, Continue with program
- Yes, monitor
- No, Proceed to more intensive intervention/referral, moderator analysis

50% symptom Reduction by Mid-Intervention

- Yes, Continue with program
- No, Proceed to more intensive intervention/referral
Healthy Body Image Model:

University A: Recommend universal screening, all 1st yr students
N =640 (females only)
Healthy Body Image Model:

University A: Recommend universal screening, all 1st yr students
N =640 (females only)

Low risk for ED
N = 395 (62%)

High Risk
N = 224 (35%)

Clinical ED?
N = 21 (3%)
Healthy Body Image Model:

University B: Community based screening
332 (females only)
Community-based Screening/Culture Change

- Mindful eating workshop
- Modernization and Beauty Lecture
- Nutrition for athletes
- Posters, cards awareness materials in fitness center
- Food week
- New sorority member outreach
- Drop-in office hours
- Presentations to 1st years
- Consortium and ED care team
- Peer Health Educator training
- RA training
- Shapes and sizes of beauty
- The Whole Image in multiple sororites

Presentations to 1st years
Healthy Body Image Model:

University B: Community based screening
332 (females only)

- Low risk for ED
  N = 112 (34%)

- High Risk
  N = 166 (50%)

- Clinical ED?
  N = 54 (16%)

Actual vs. Expected
Current/Future Directions

Address culture

Create clinical dashboards

Combine technologies
  --A set of “apps”

“Big data”

Personalization algorithms

Key word/term searches
Address Culture

The Whole Image

Body Image Culture Change for College Students
Clinical Management Tools
Combine Technologies

NUTRIVISE
what's the healthiest meal near my office?
Get the free app >

Map with markers indicating locations.

Fitness trackers and a smartphone displaying activity data.
IaM Study (NIMH MH081125): 553 Potentially eligible

- Low risk for ED
  N = 95

- High Risk
  N = 169

- Very High Risk
  N = 206

- Clinical ED?
  N = 55, referred
Healthy Body Image Model: Moving to Smart Trials

Is Moderation Necessary? -- probably

IaM Study (NIMH MH081125): 553 Potentially eligible

High Risk
N = 169 randomized

Moderation
No moderation

Kass et al, Does a guided discussion group improve outcome?
A randomized controlled trial, submitted
Healthy Body Image Model: Moving to Smart Trials—2 examples

What Groups Are Not Being Reached?

University C: Community Screen
21% of students have had ED

Need: Develop an Relapse Prevention Program

Method:
Work with Consortium To Undertake Evidence Based Trial: Jacobi, Dresden
Healthy Body Image Model:

University C: Expanded Model

- Overweight Obese
- Low risk for ED
- High risk
- Hx of ED, Want Relapse Prevention
- Clinical ED
Healthy Body Image Model:

Organic programming (using process data for rapid program revision)

University B: Community based screening

Clinical ED?
N = 50

“Too much talk of restraint”

Intervention
Control
Healthy Body Image Model:

Smart Trials: Organic programming (using process data for Rapid program revision) Add another version

University B: Community based screening + EDEQ restraint

- Add restraint measure
- Add non-restraint program

Clinical ED

Restraint?

Non-restraint version

Restraint version
Chapter 4: An Integrated School-Based Obesity/Eating Disorder Screening and Intervention Program

Eating Disorders begin early, develop programs for high school (and middle schools)

Since healthy weight regulation is key to both eating disorders and overweight, have a uniform message

Schools are more interested in weight that ED but fear that talk about weight will increase EDs

To reach this defined population (all 9th graders) need programs for boys and girls and for those with no risk of EDs or Obesity
At risk of overweight group
High weight and shape concerns group
Referral for anorexia
Healthy weight regulation program only
Other?
Staying Fit

Prevention Based Program

Green Foods

Another very important way to practice healthy eating is to eat low-fat, low-calorie, and high nutrient foods. In the Staying Fit program, these highly nutritious foods are called GREEN foods.

- 12-week Internet-based program for males and females
- Designed to encourage students to adopt or maintain healthy nutrition and exercise habits and alleviate excessive body image concern
StayingFit Incorporates a Number of Interactive Monitoring Tools, e.g.

Staying Fit  Prevention Based Program

Session (1) Logs: Meal Size Log

These are your logs that you will fill out each week. On the first log you will choose a typical day from the last week and think about the meals you had. On the next log you will record the number of fruits, vegetables and other green foods you ate on that day. On the third and fourth logs, you will monitor your weight and record your physical activity for the week.

Meal Log

In this log you will think about the food you ate one of the days this week. Usually, it’s easier to remember what you ate yesterday, so pick out yesterday’s date from the calendar below. However, if yesterday wasn’t typical for you (if you changed your usual eating habits for some reason), pick a typical day from the last week from the calendar:  

Friday, March 11

In the log below, think about the meals and snacks you had on Friday, March 11 and try to get a sense of how hungry you were before your meal and how full you were after you stopped. Use the drop down menus to enter information about your meals.

<table>
<thead>
<tr>
<th>Time</th>
<th>Meal Type</th>
<th>Meal Size</th>
<th>How hungry were you before you started eating?</th>
<th>Rate level of fullness when you stopped eating.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hour</td>
<td>Minute</td>
<td>AM</td>
<td>Hunger</td>
<td>Fullness</td>
</tr>
<tr>
<td></td>
<td>Meal/ Snack</td>
<td>Meal Size</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
StayingFit Incorporates a Number of Interactive Monitoring Tools, e.g:

Session (1) Logs: Food Log

Now that you've thought about your meals and snacks, think about what types of foods you ate. Think about what you did on and record what you ate and drank on the log below.

Need a refresher about how to log your red foods and green foods? Click here!

Click in number of cups of fruit you had on
Your goal= about

Click in number of cups of vegetables you had on
Your goal= about

Click the number of cups of other green foods (whole grains, beans and light dairy) you had on
Your goal=about
One month, our volunteer staff:
Spent a few hours each week delivering StayingFit to 400 of these kids:
Summary of StayingFit/Component Studies In Adolescents

Strong effect sizes for reducing weight in overweight students recruited from schools/community
- Jones et al Ped. 2008, 121:453
- Doyle et al J Adol Health 2008, 43: 172

Significant effect on increasing exercise when delivered to entire class of 9th grade students

Weight control without increase in weight and shape concerns
StayingFit (or equally good programs) Should Be Available to Every 9th 12th Grade Student in America

The schools want it but who will pay for it?

Technology can reduce the cost of dissemination but it is not free

Partner with companies?

Develop a national center?

Add Health as a metric/standard for graduation!

Create school-based StayingFit Communities
Chapter 5: A Dream: StayingFit Communities
In this example the defined population is all 9th grade students at a SF High School. The goals are:

- Healthy weight regulation
- Weight maintenance
- Good body image
Staying Fit: All 9th graders in the High School

YMCA: Facility for Exercise Follow-up
Staying Fit Communities

- Staying Fit:
  All 9th graders in the High School

- YMCA:
  Facility for Exercise Follow-up

- Link to families
Staying Fit: All 9th graders in the High School

YMCA: Facility for Exercise Follow-up

Link to families

Healthier food in the school

Every child deserves access to healthy food.

We believe youth everywhere should have access to real foods. Foods made with carefully considered ingredients that promote healthy growth and development. After all, creating smart minds starts with fueling healthy bodies.
Staying Fit Communities

- Staying Fit: All 9th graders in the High School
- YMCA: Facility for Exercise Follow-up
- Link to families
- Healthier food in the school

Every Child Deserves Access to Healthy Food

We believe every child should have access to healthy, whole foods. Foods made with carefully considered ingredients that promote healthy growth and development. After all, healthy minds start with healthy bodies.
Staying Fit: All 9th graders in the High School

+ YMCA: Facility for Exercise Follow-up

+ Link to families

+ Healthier food in the school

+ Knowledge about healthier meals
Staying Fit Communities

- Staying Fit: All 9th graders in the High School
- YMCA: Facility for Exercise Follow-up
- Link to families
- Healthier food in the school
- Knowledge about healthier meals
- Individuals linked through social Networks/database
StayingFit Communities: 9th graders+

SF Public Health Department
+ Social Media

It may not take a lot of people but it takes very very dedicated people
Let the Revolution Continue

Technologies are now very inexpensive:
  StudentBodies Classic -- $1M
  WholeBody (wordpress) -- $500

Generic/public programming platforms are available
  www.lifeguideonline.org

As are commercial products

Collaborate (including with industry)
Bridging the academic-technology/start up “gap”:

Issues:

Cultural—
  Quick turnaround
  Profit

Practical—
  Sustainability
  Product control
  Innovation
  Who owns the data

Content Administration
Let the Revolution Continue

Define the population you care about

Define the outcome

Use technology (including data) to help get your there

Be imaginative

Be bold
Let the Revolution Continue

And don’t forget to have fun!

Thanks!