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

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The FCP: Some Lessons Learned

Media/community organization can reduce risk factors across a population

Farquhar et al: JAMA, 264(3), 359-365, 1990

But secular trends are very powerful

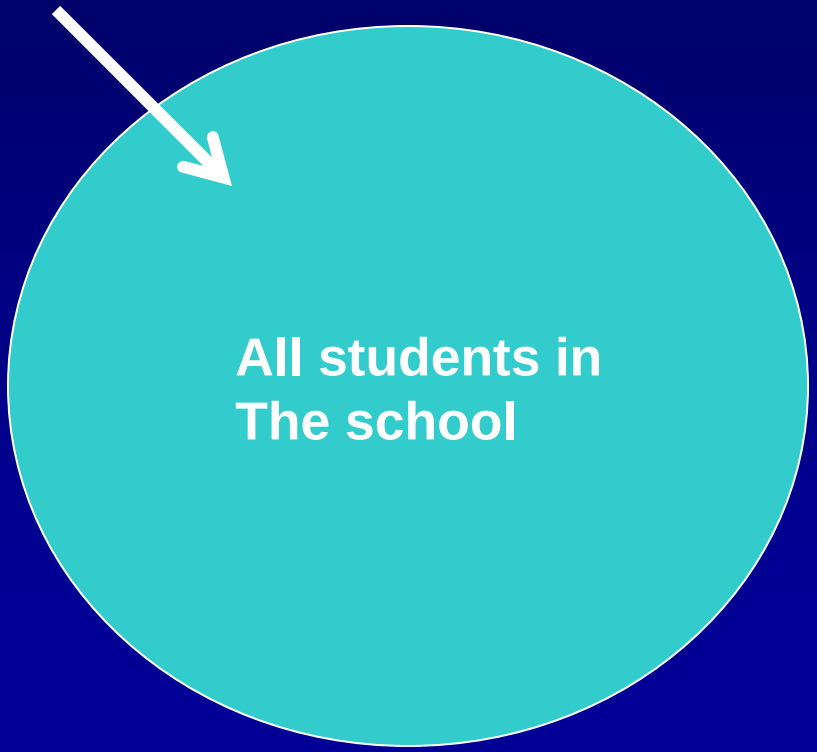
Fortmann SP & Varady AN. AmJEpidemiol 2000; 152: 316, 1999

Winkleby et al:. AJPH, 86, 1773, 1996.

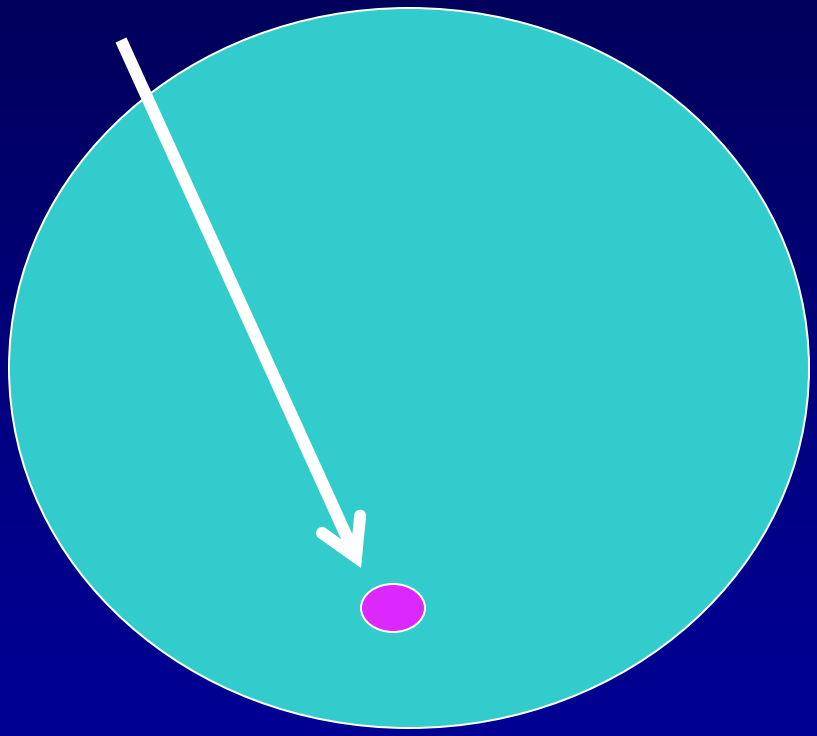
And the issues related to addressing whole populations are daunting, including lack of resources, focus and difficult to measure outcomes

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:

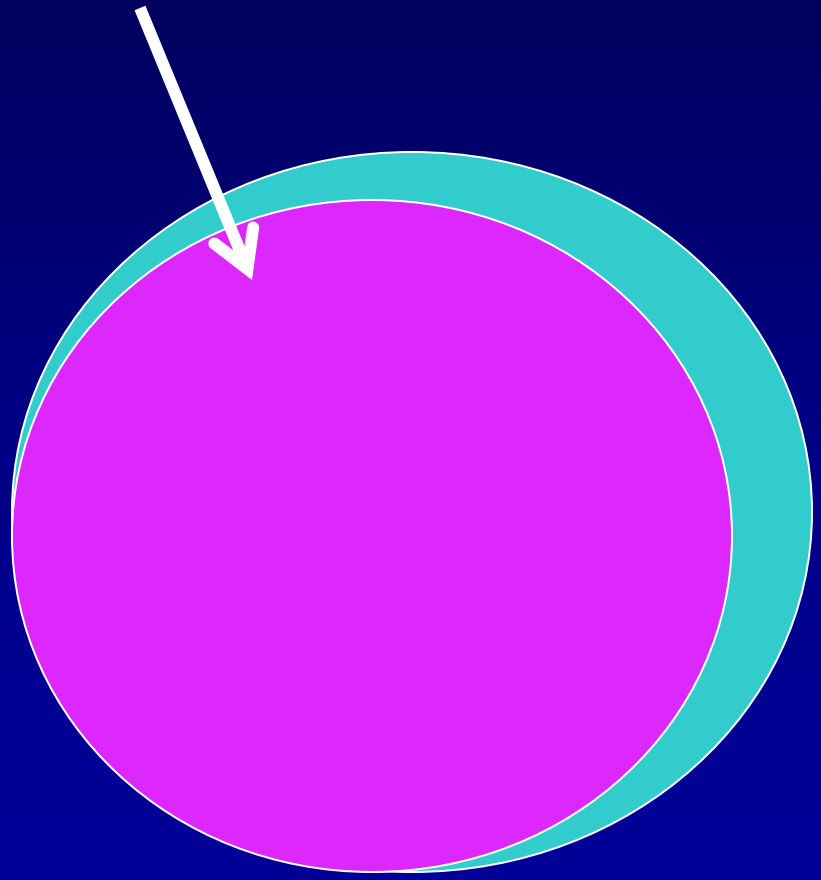


The Reach Within a School of an Internet Program Provided On-line Independent of School:



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

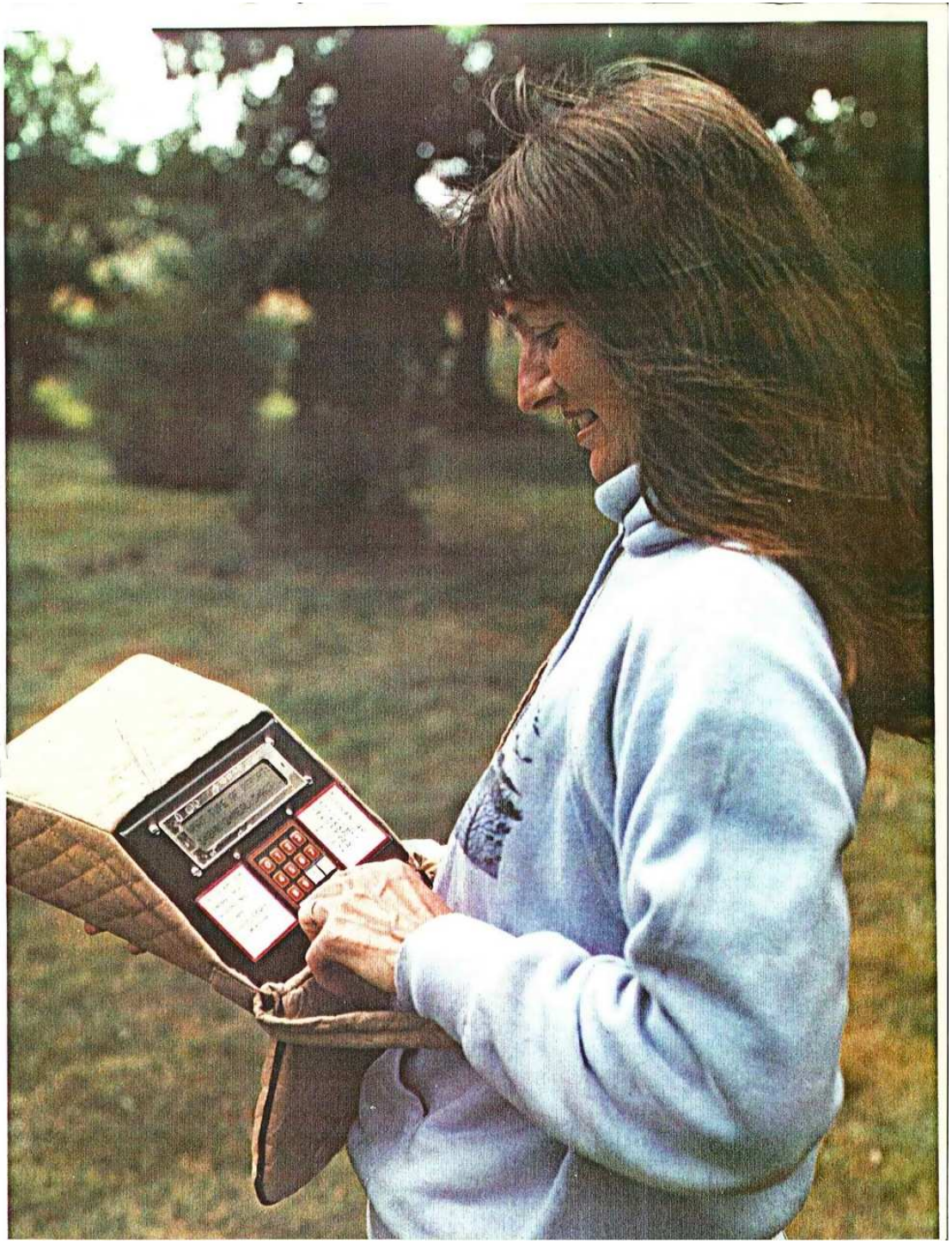
What is Technology: The use of software programs and running on hardware and the data collected

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:



Burnett et al: Ambulatory computer-assisted therapy for obesity: A new frontier for behavior therapy.JCCP, 53, 698, 1985.

.

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

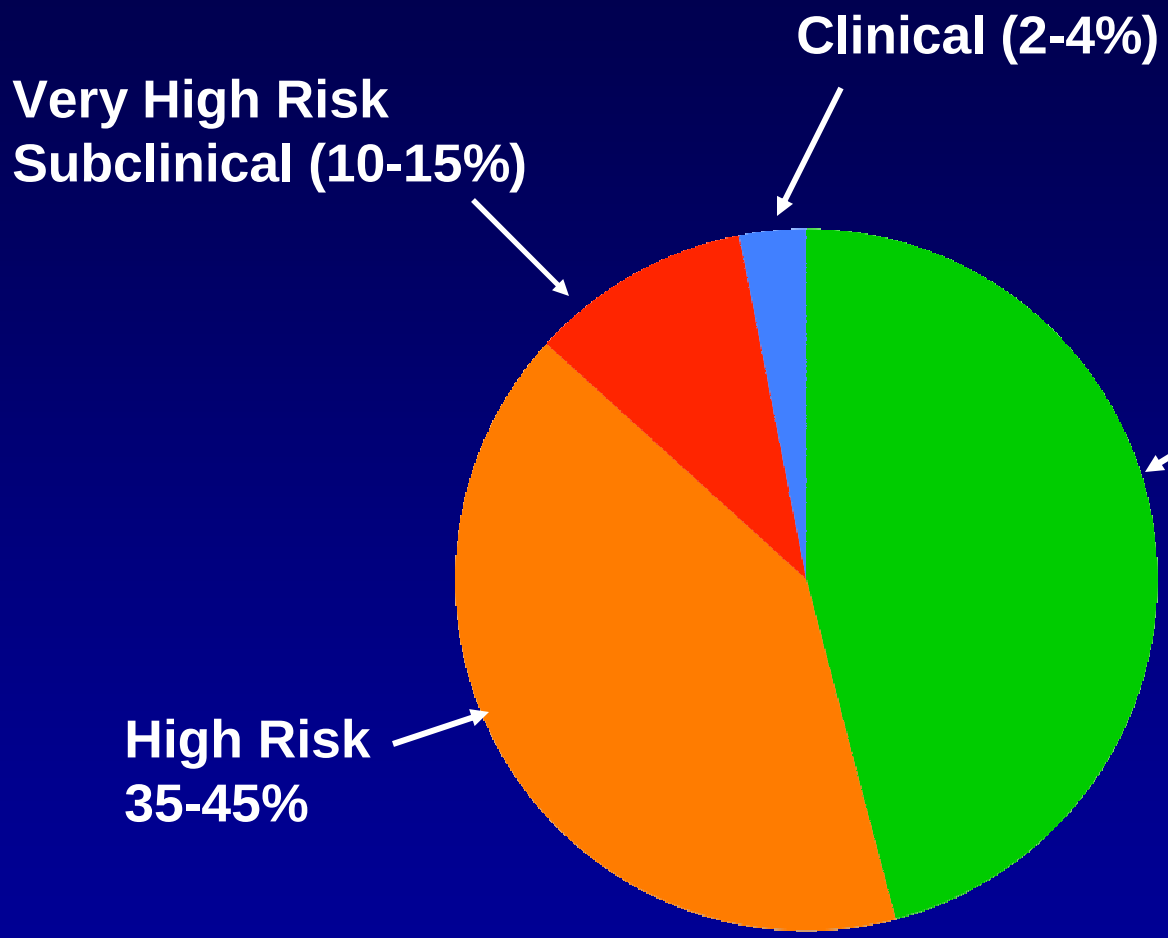
Why eating disorders?

--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



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

Killen et al, 13(4), 369, 1993.

Intervention

- Internet-delivered

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

- 8 sessions, with different weekly topics

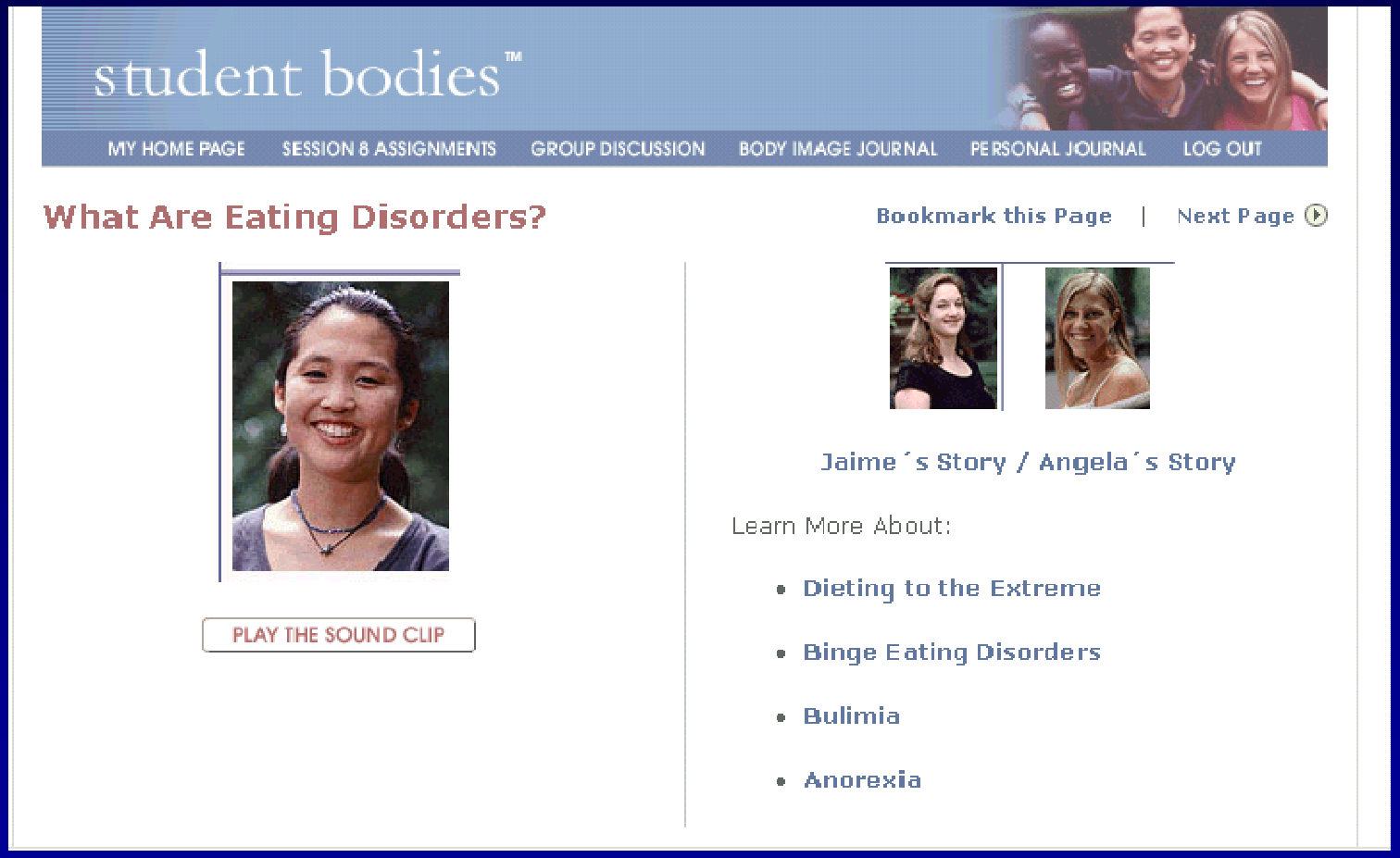
- Moderated asynchronous discussion group

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

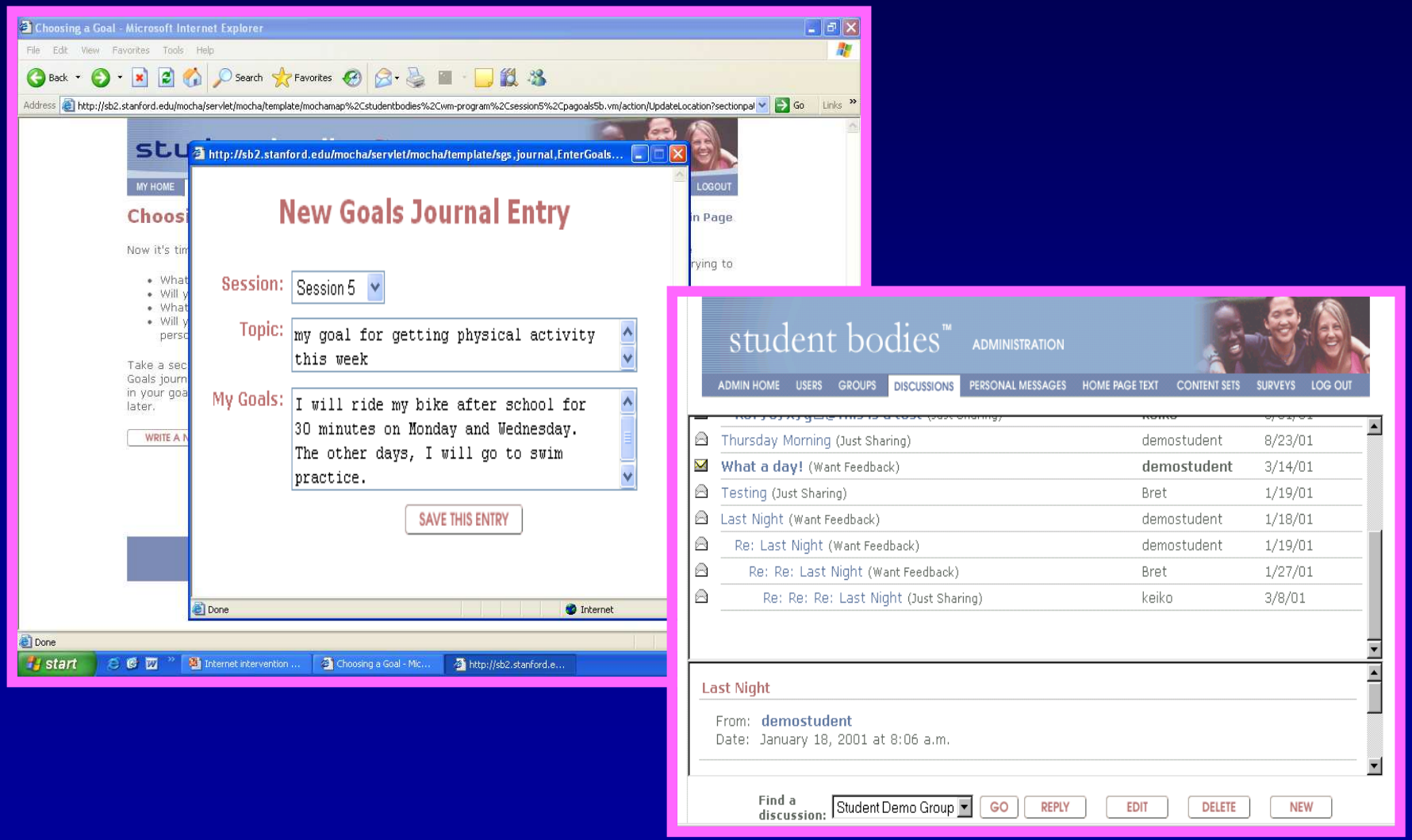
- Body-image journal

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

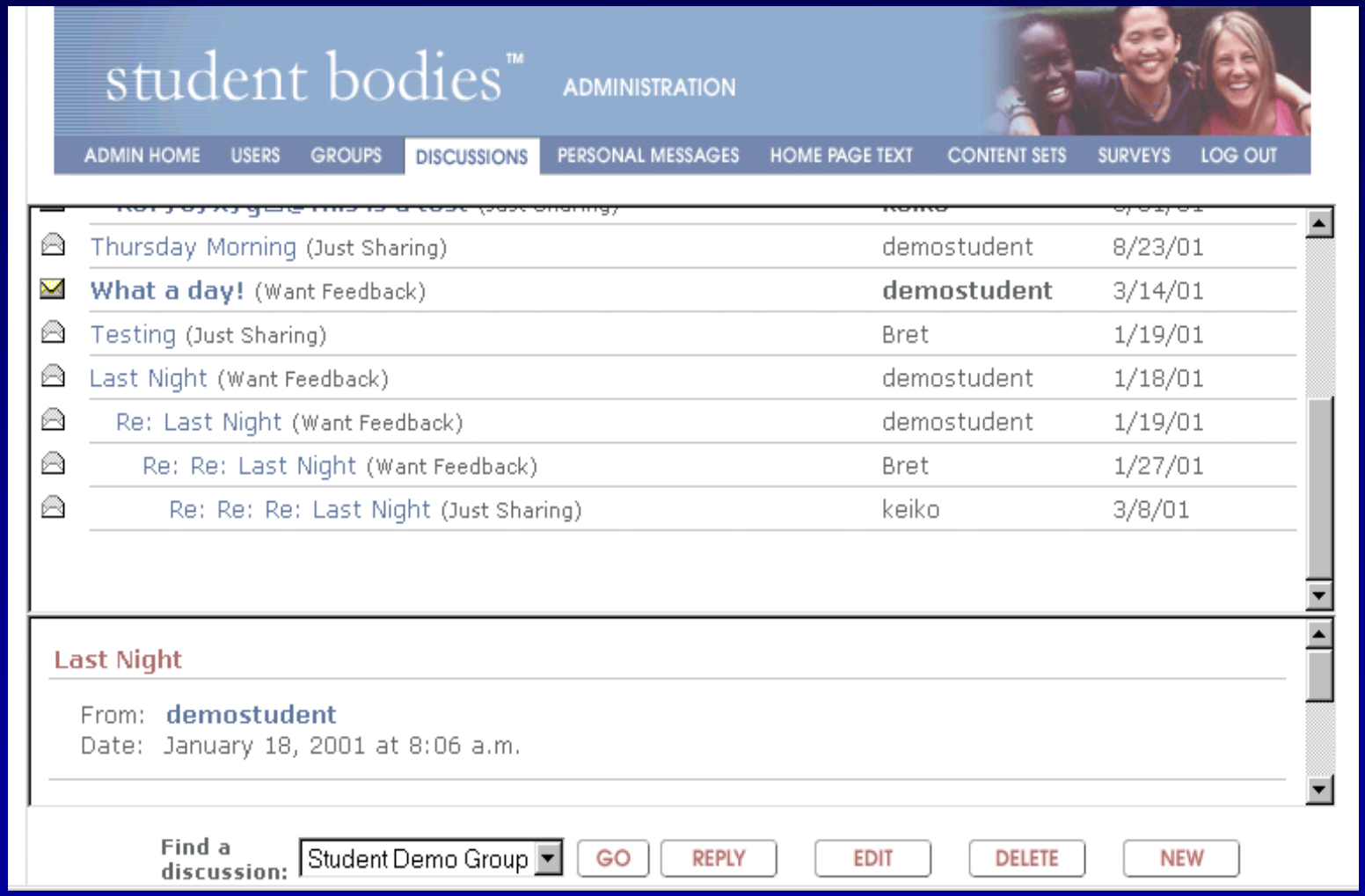
Psychoeducation



Personal & Interactive



Discussion Group

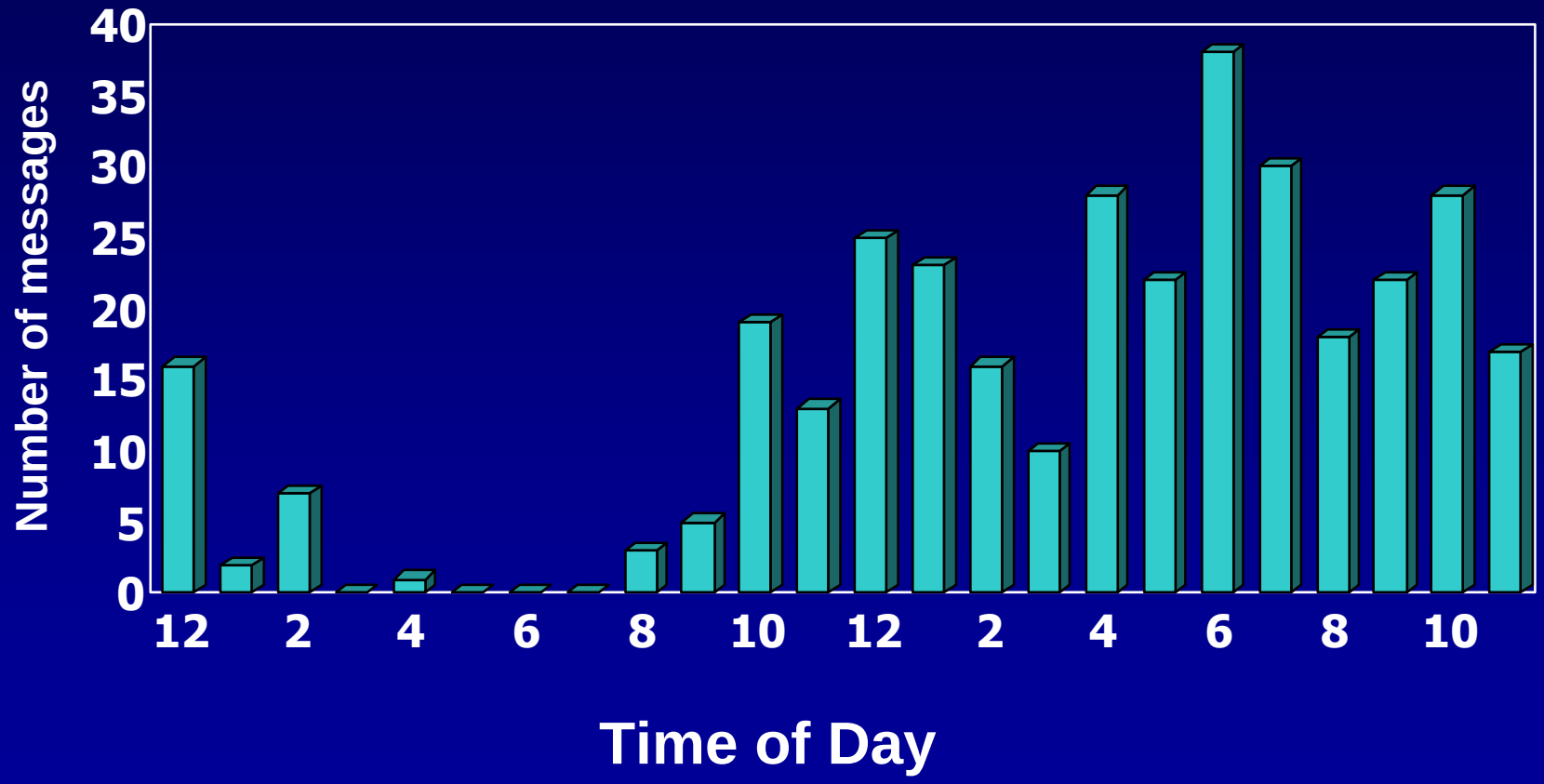


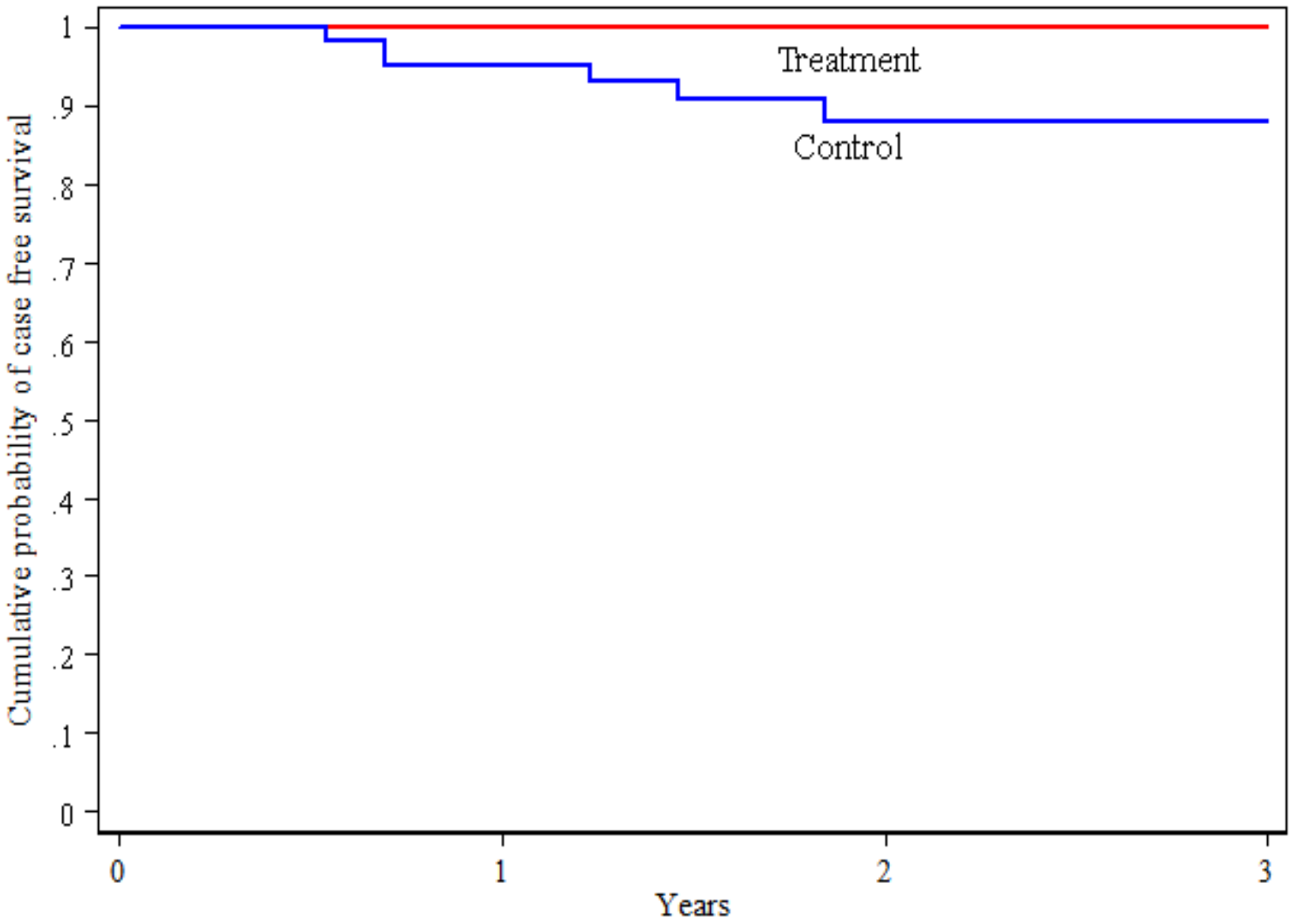
Participants

- 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)

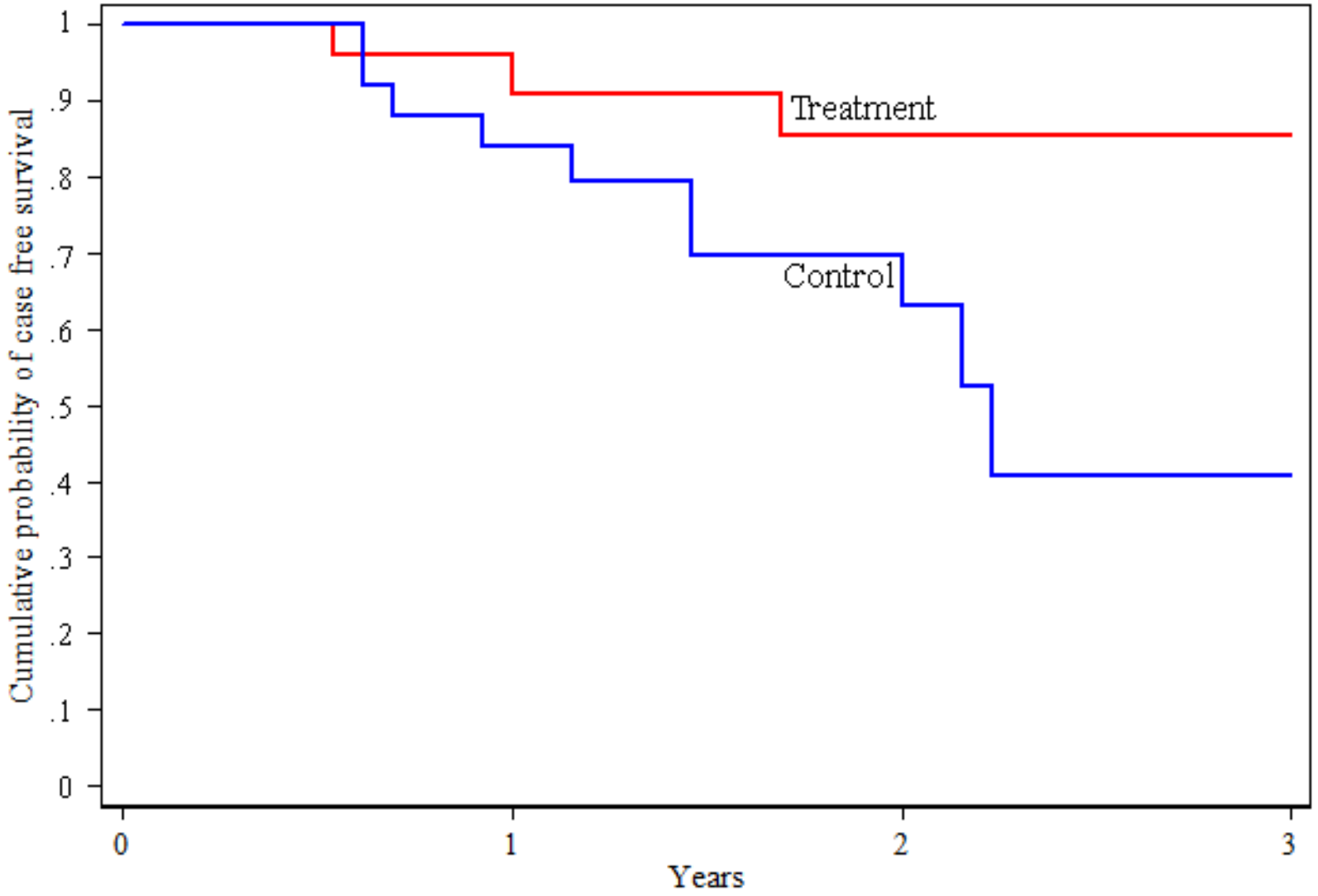
Taylor et al. Prevention of Eating Disorders in At-risk College-Age Women, Arch Gen Psychiatry, 2006, 63, 831.

Log-ons by Time of Day





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

Stice et al IJED 35, 4, 2004; Taylor et al, in, Treating and Preventing Adolescent Mental Health Disorders, Chap 15, 2006.

*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)

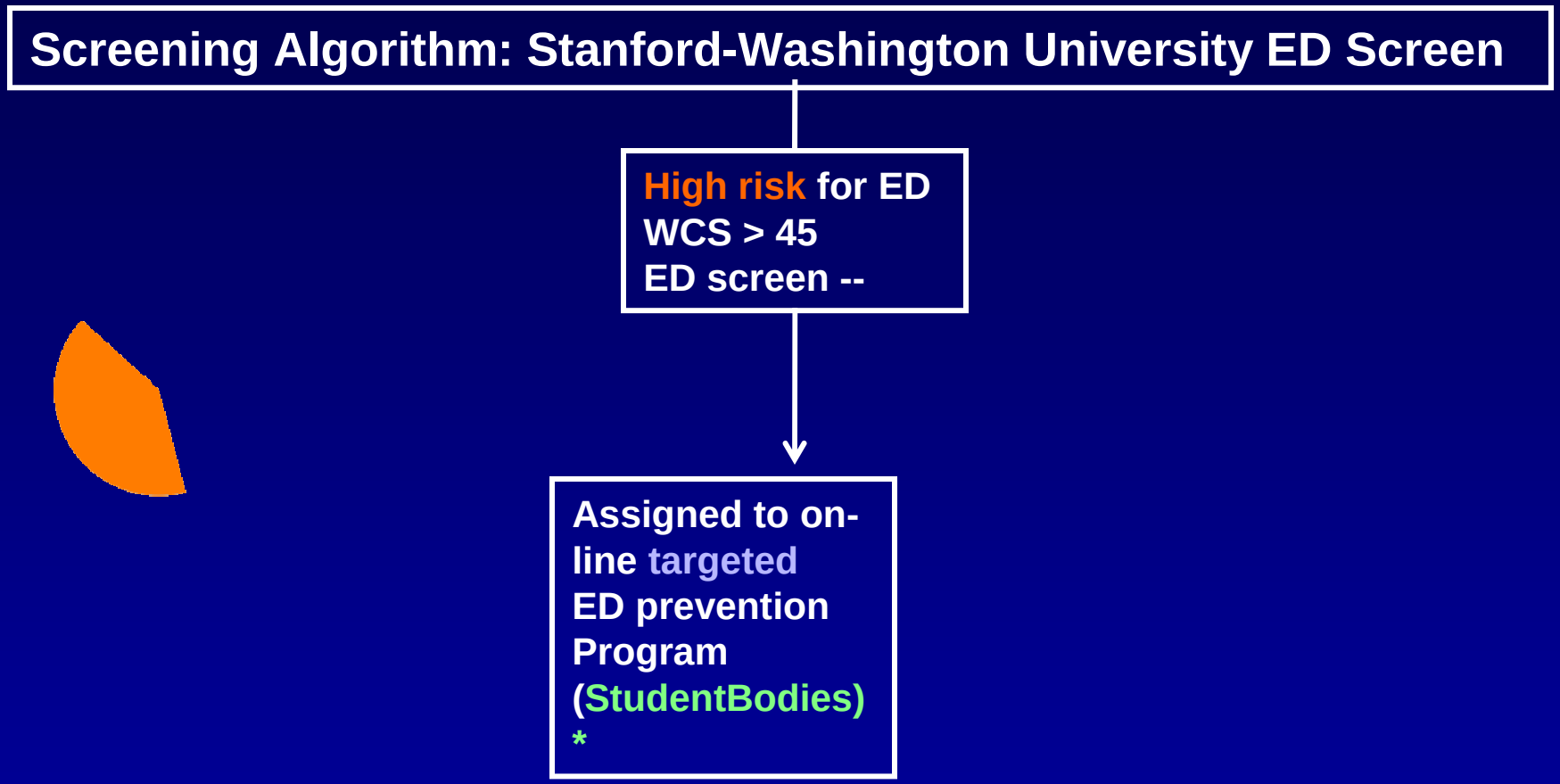
(4) Reduces the incidence and prevalence of EDs

Collaborators

Healthy Body Image Model:

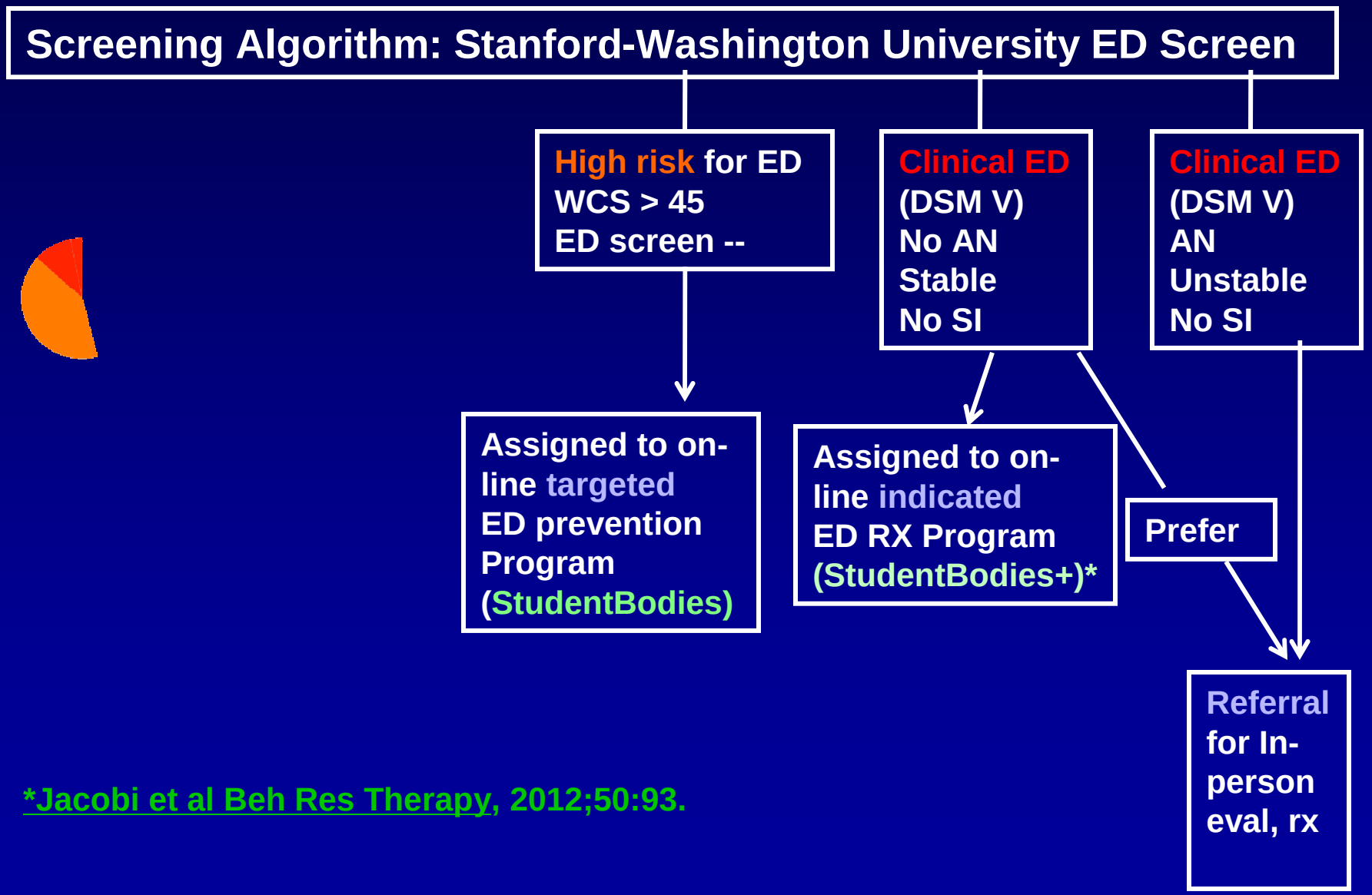
Screening Algorithm: Stanford-Washington University ED Screen

Healthy Body Image Model:



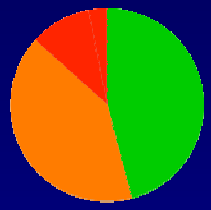
*Taylor et al Arch Gen Psych 2006; 63:831

Healthy Body Image Model:



*Jacobi et al Beh Res Therapy, 2012;50:93.

Healthy Body Image Model:



Screening Algorithm: Stanford-Washington University ED Screen

Low risk for ED
WCS < 45
Screen --

High risk for ED
WCS > 45
ED screen --

Clinical ED
(DSM V)
No AN
Stable
No SI

Clinical ED
(DSM V)
AN
Unstable
No SI

Assigned to on-line universal Healthy weight regulation/body Image program (StayingFit)*

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

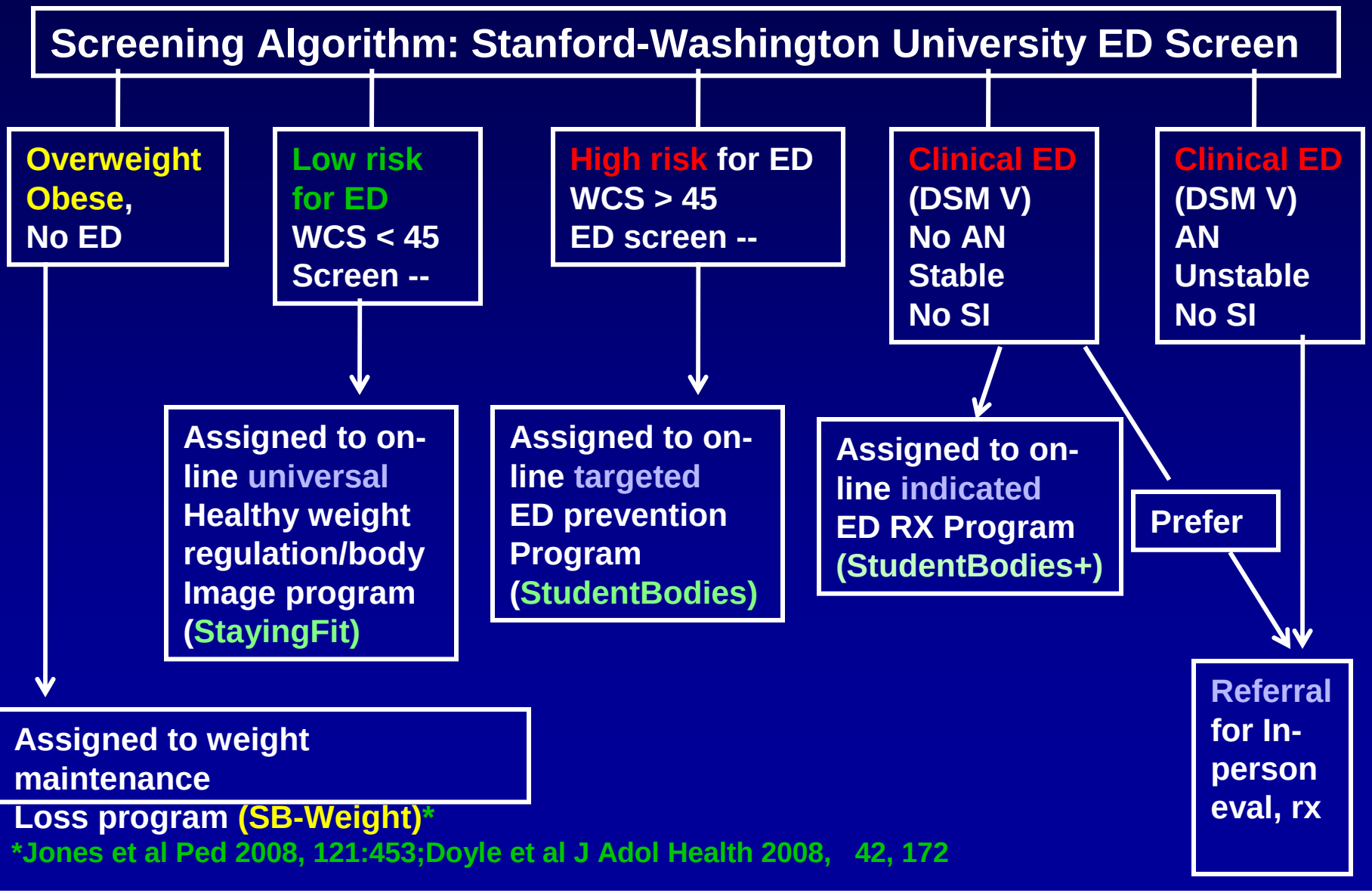
Assigned to on-line indicated ED RX Program (StudentBodies+)

Prefer

Referral for In-person eval, rx

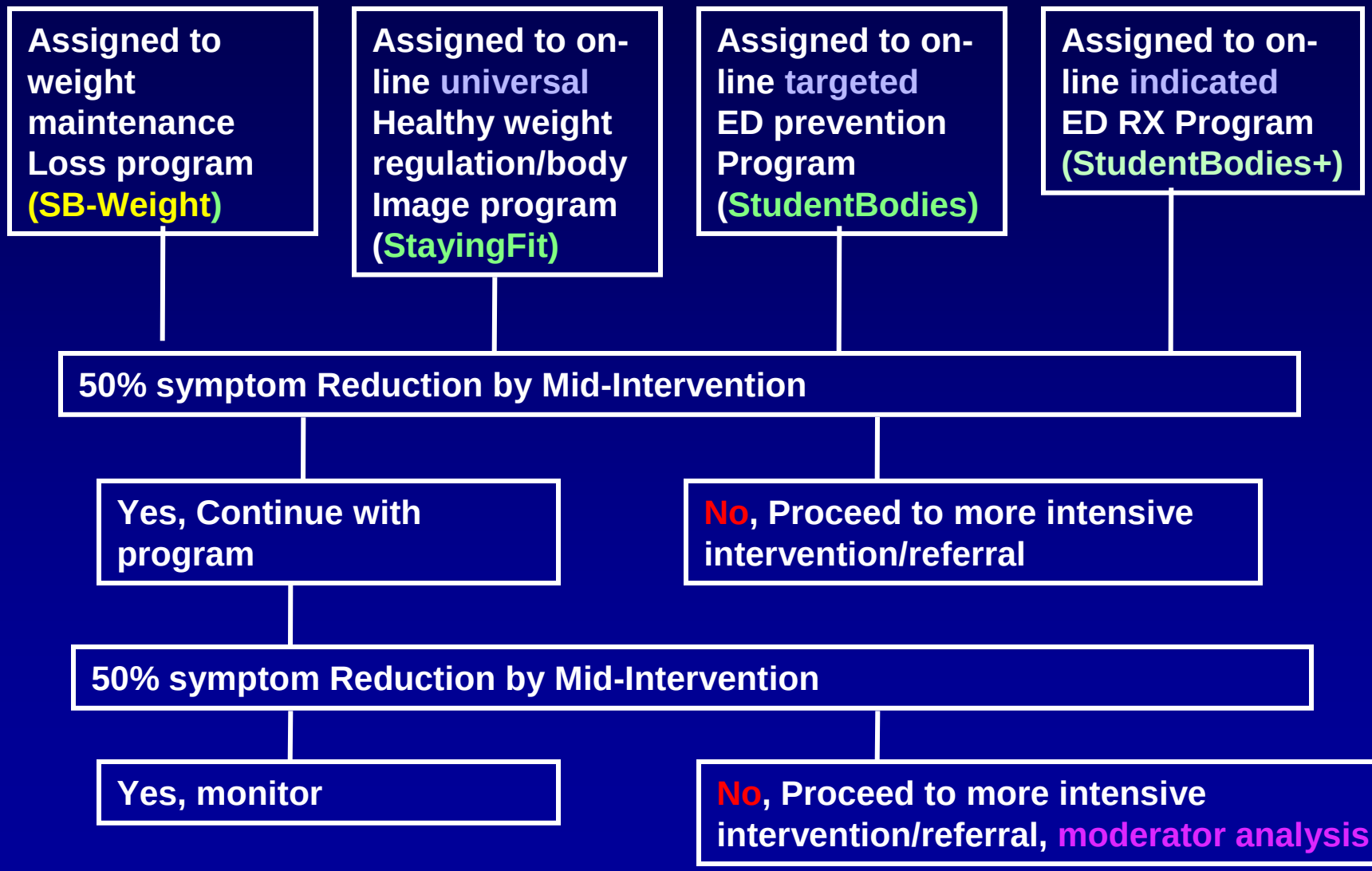
*Taylor et al, Int J of Obesity, in press

Healthy Body Image Model: Two dimensional model



*Jones et al Ped 2008, 121:453;Doyle et al J Adol Health 2008, 42, 172

Healthy Body Image Model: Follow-up



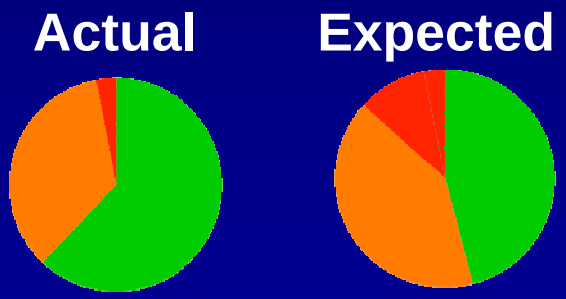
Healthy Body Image Model:

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)

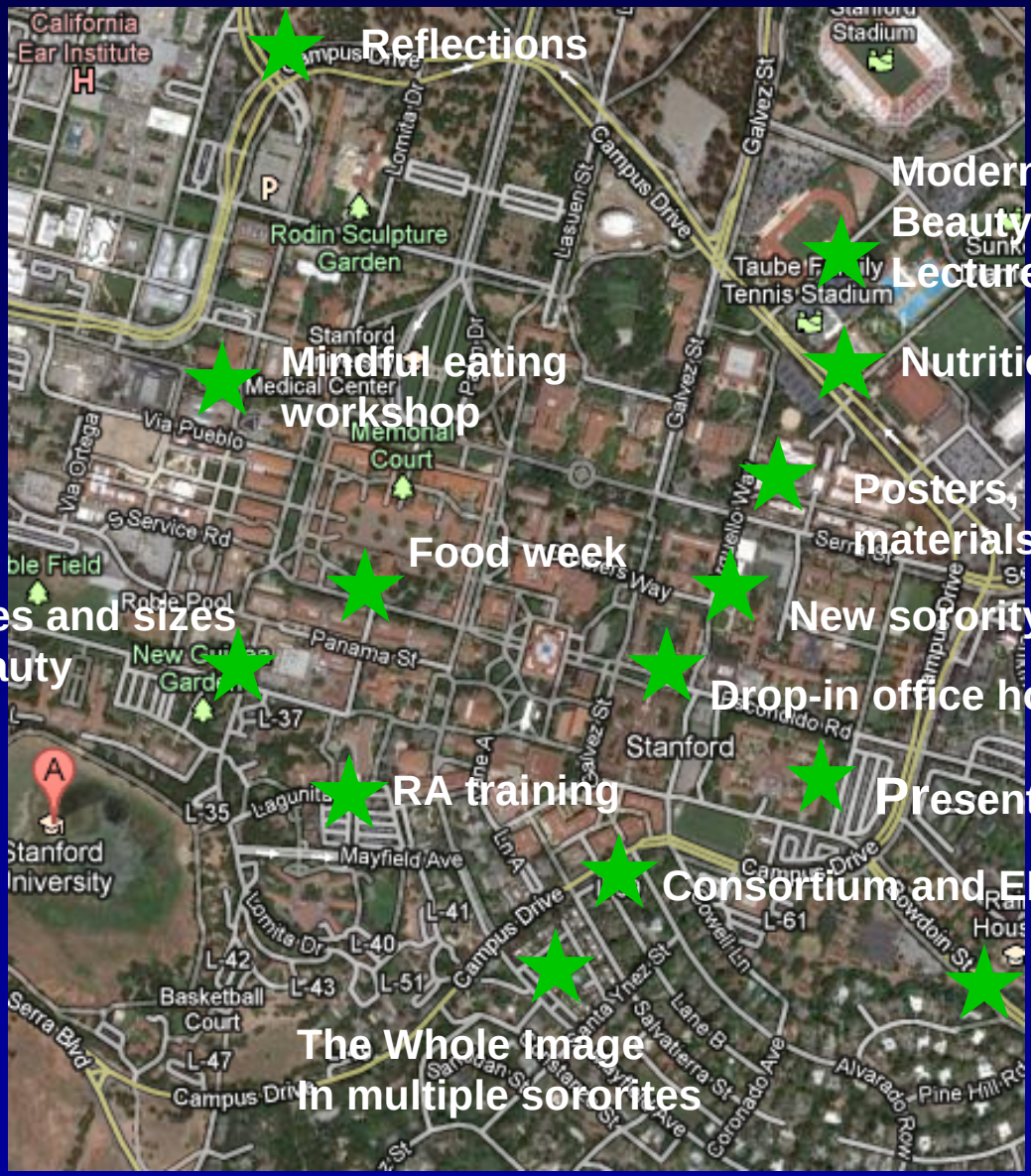
Low risk for ED	High Risk	Clinical ED?
N= 395 (62%)	N = 224 (35%)	N = 21 (3%)



Healthy Body Image Model:

University B: Community based screening
332 (females only)

Community-based Screening/Culture Change

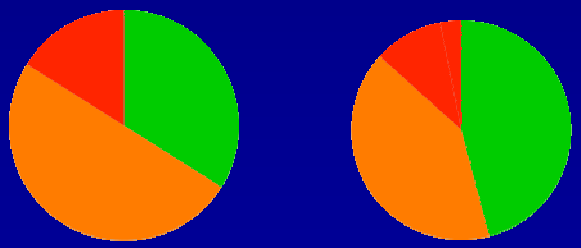


Healthy Body Image Model:

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 **Expected**



Current/Future Directions

Address culture

Create clinical dashboards

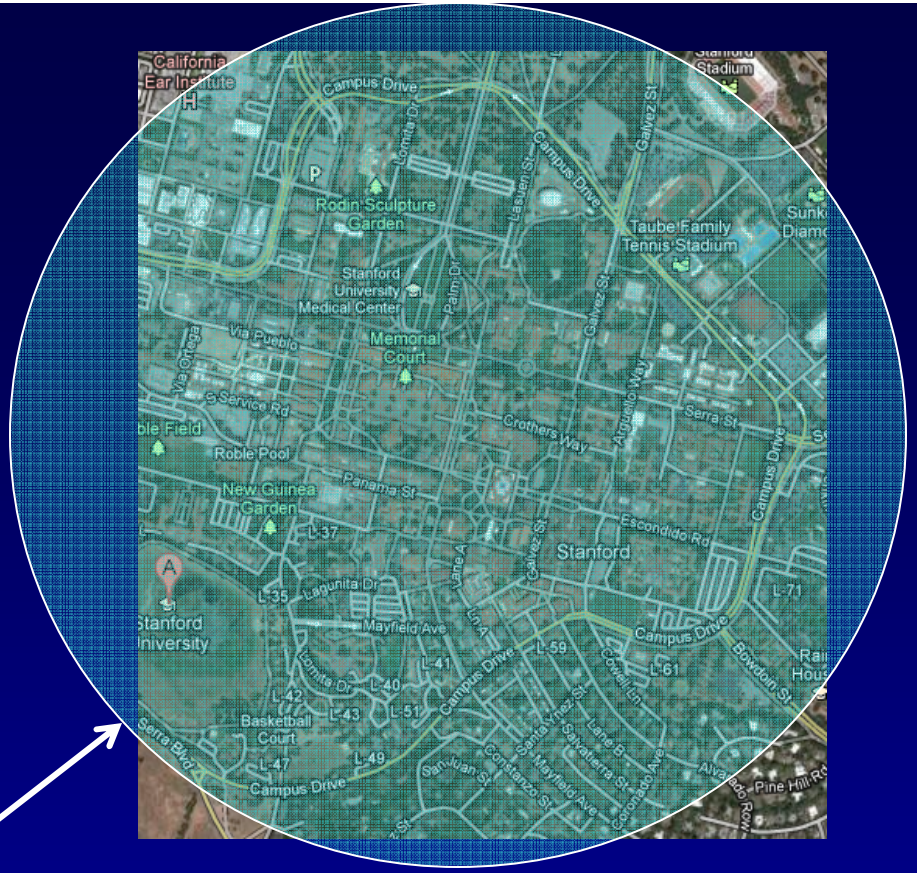
Combine technologies
--A set of “apps”

“Big data”

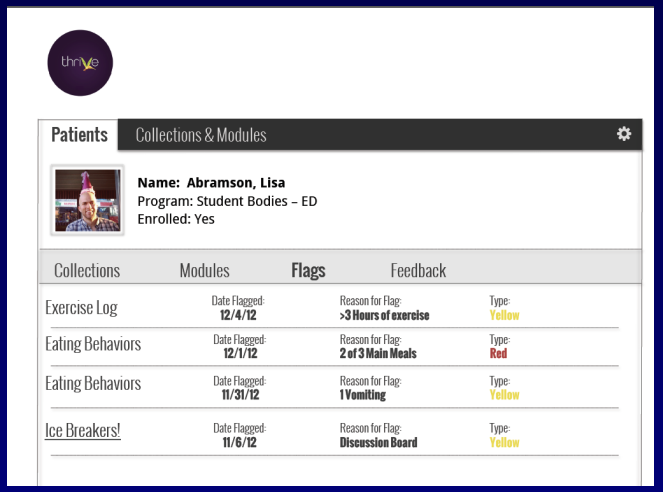
Personalization algorithms

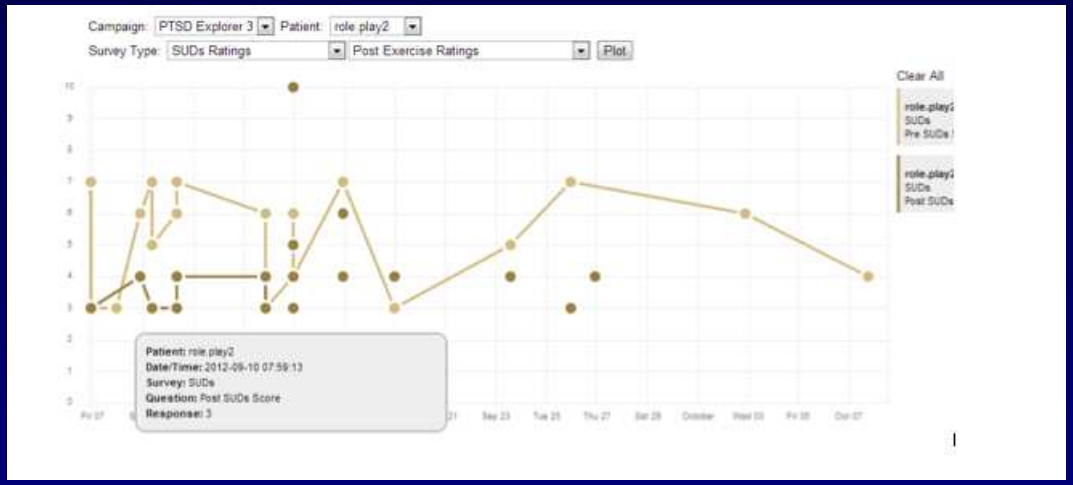
Key word/term searches

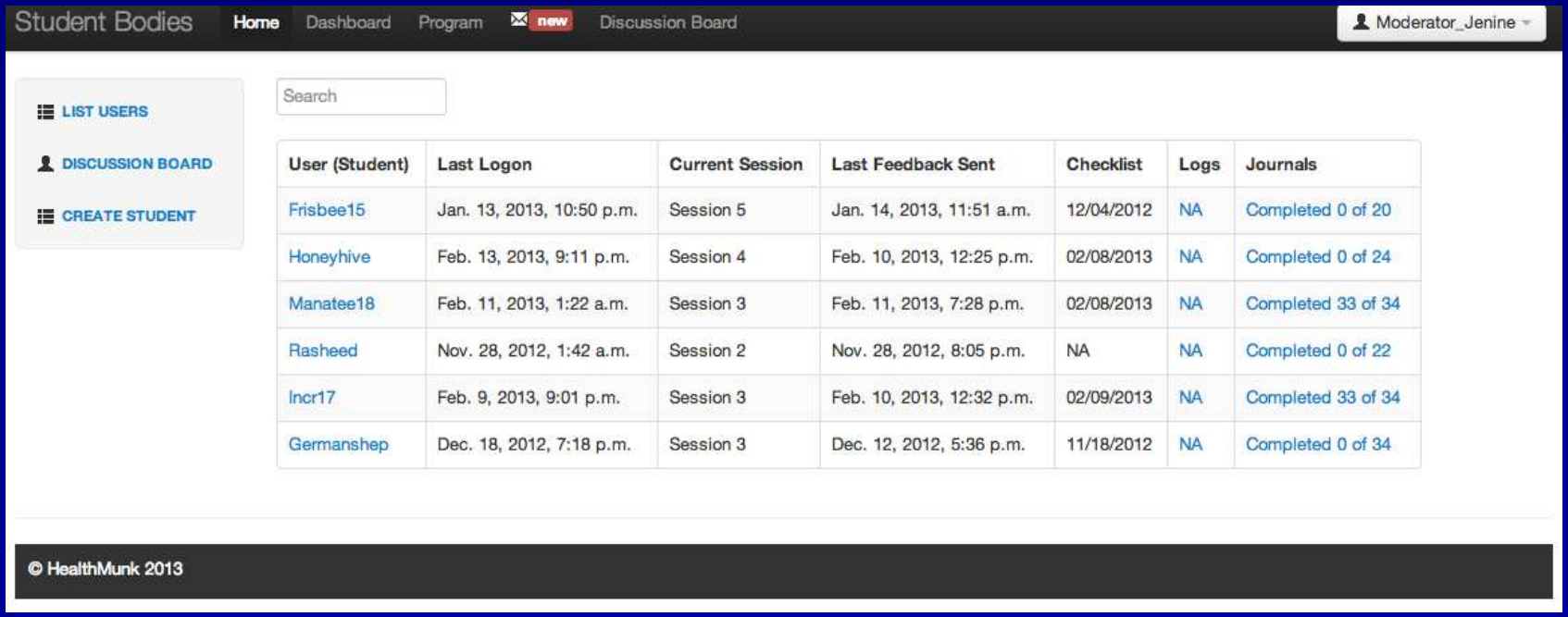
Address Culture



Clinical Management Tools

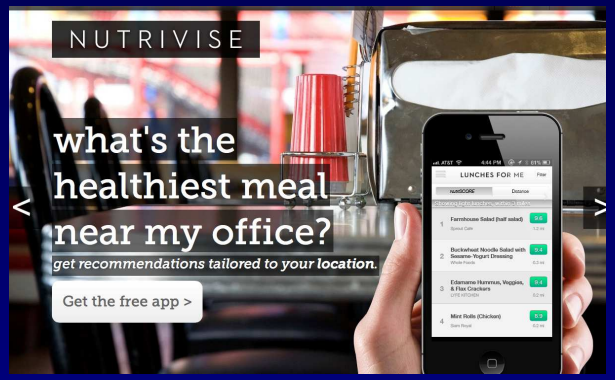






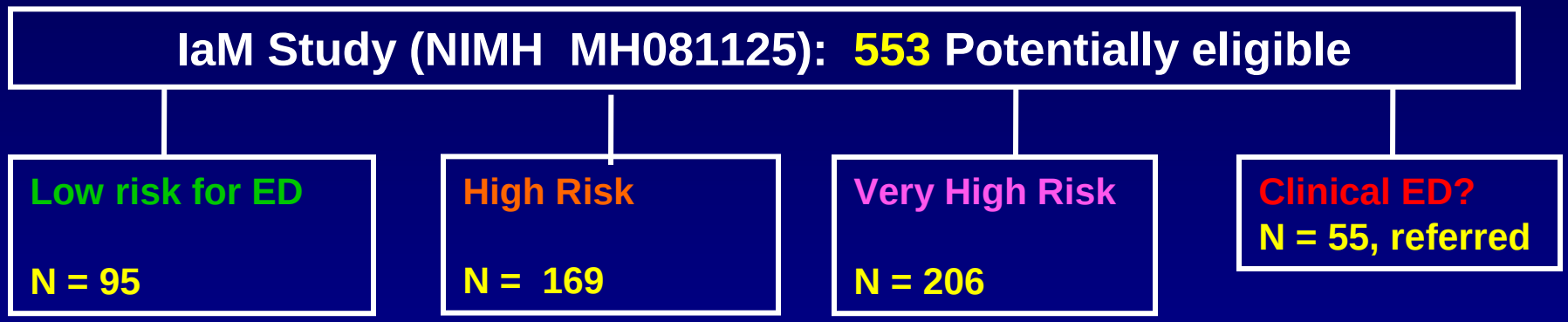
User (Student)	Last Logon	Current Session	Last Feedback Sent	Checklist	Logs	Journals
Frisbee15	Jan. 13, 2013, 10:50 p.m.	Session 5	Jan. 14, 2013, 11:51 a.m.	12/04/2012	NA	Completed 0 of 20
Honeyhive	Feb. 13, 2013, 9:11 p.m.	Session 4	Feb. 10, 2013, 12:25 p.m.	02/08/2013	NA	Completed 0 of 24
Manatee18	Feb. 11, 2013, 1:22 a.m.	Session 3	Feb. 11, 2013, 7:28 p.m.	02/08/2013	NA	Completed 33 of 34
Rasheed	Nov. 28, 2012, 1:42 a.m.	Session 2	Nov. 28, 2012, 8:05 p.m.	NA	NA	Completed 0 of 22
Incr17	Feb. 9, 2013, 9:01 p.m.	Session 3	Feb. 10, 2013, 12:32 p.m.	02/09/2013	NA	Completed 33 of 34
Germanshep	Dec. 18, 2012, 7:18 p.m.	Session 3	Dec. 12, 2012, 5:36 p.m.	11/18/2012	NA	Completed 0 of 34

Combine Technologies



HBI Model: Moving to Adaptive Designs/Informative/SMART Trials

Is Moderation Necessary?



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

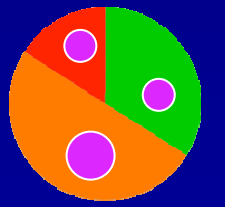
Need: Develop an Relapse Prevention Program

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

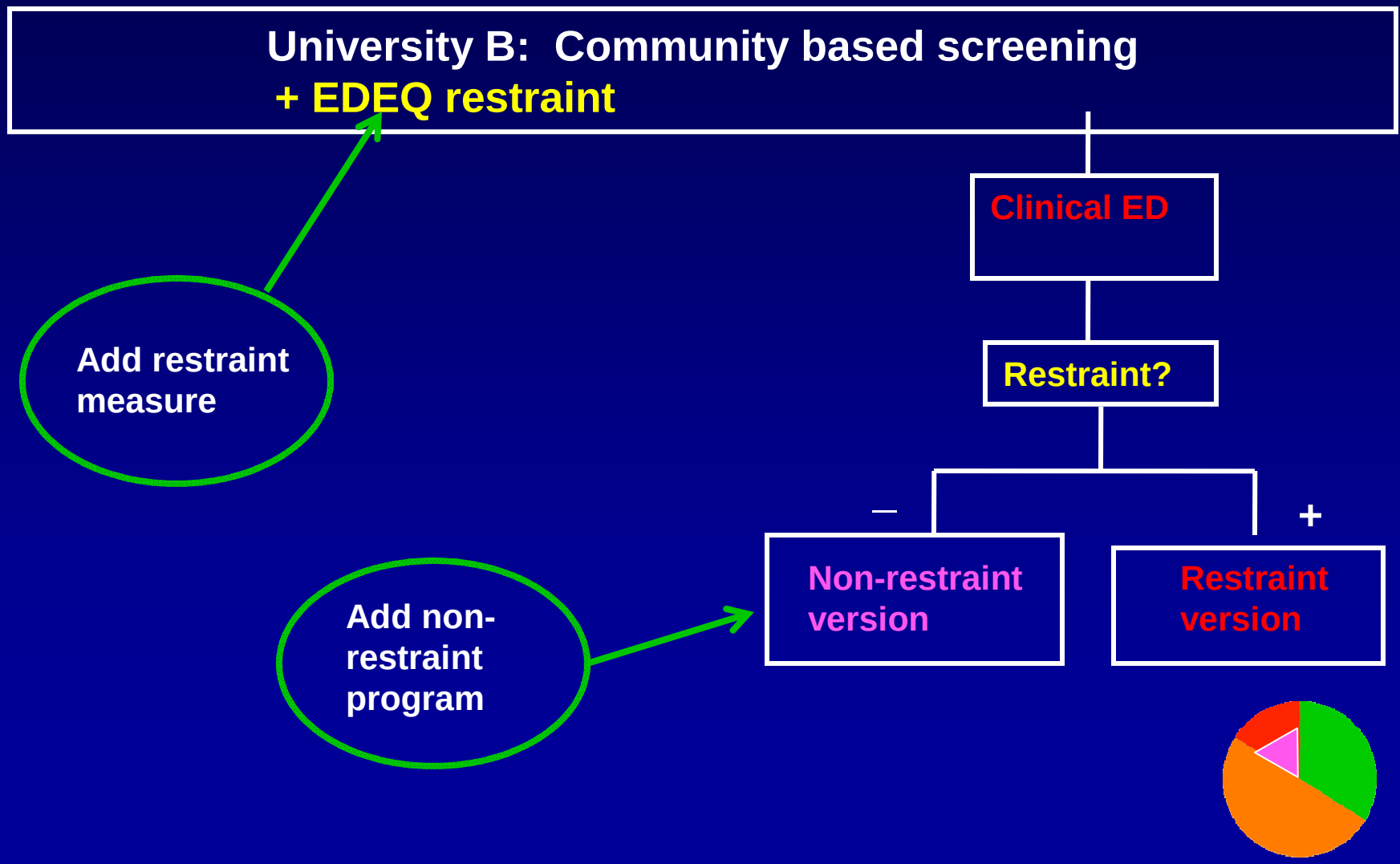
"Too much talk of restraint"

Intervention

Control

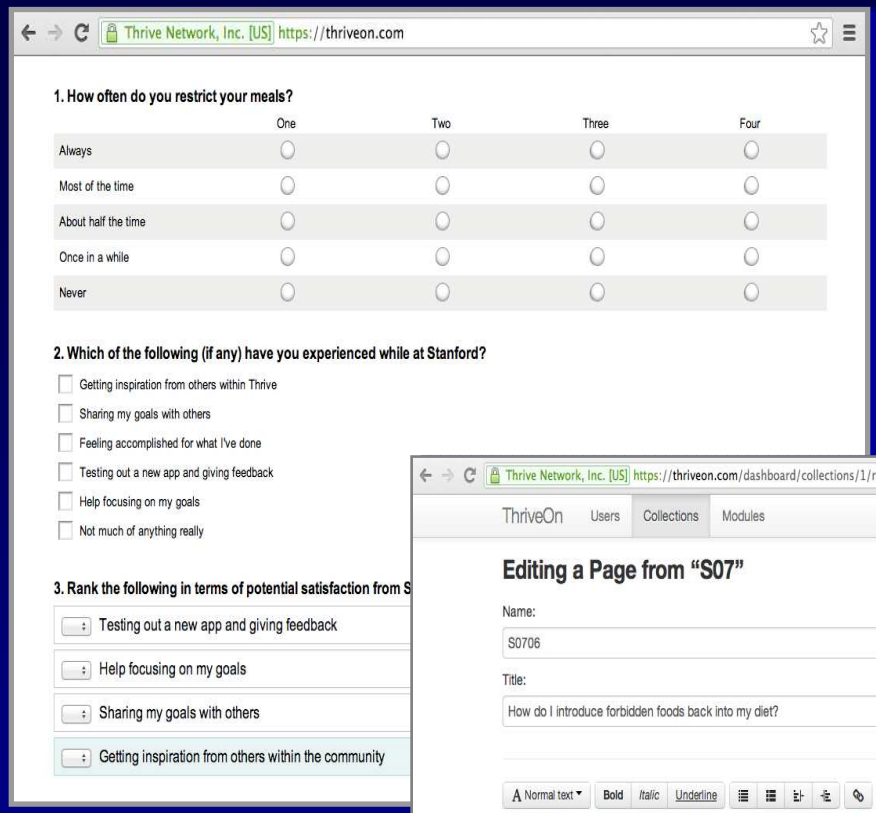
Healthy Body Image Model:

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

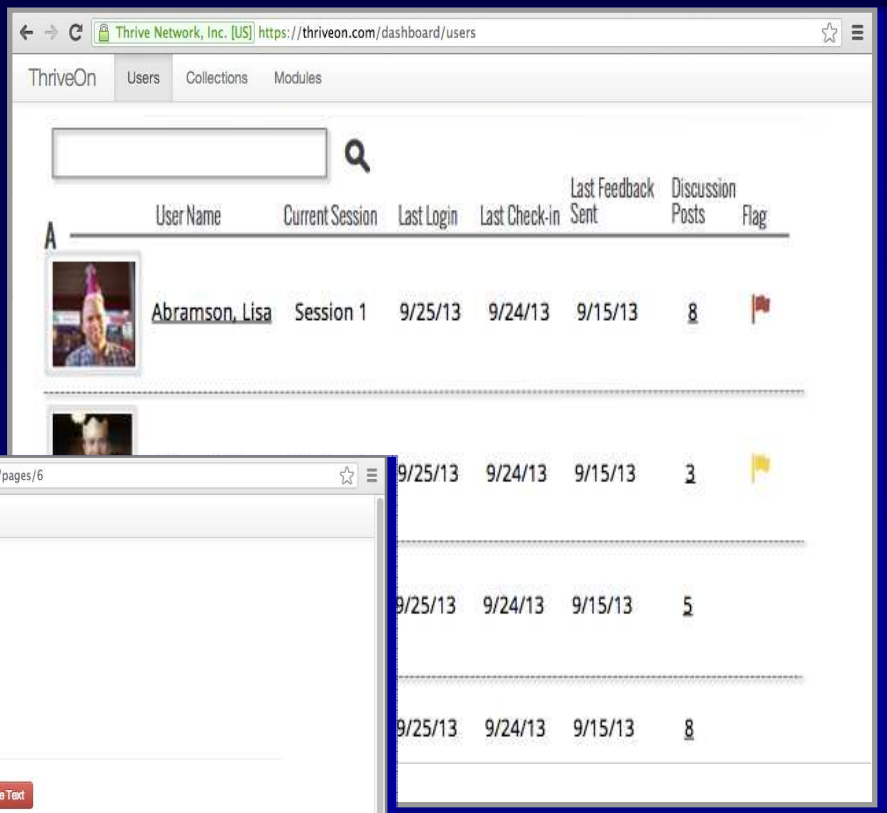


AT&T 1:56 PM 74%
Goals
2 Pros vs. Cons
2 Tasks Last checkin 33 days ago
3 Exercise Log
2 Tasks Last checkin 33 days ago
4 My Goals
4 Tasks Last checkin 33 days ago
5 Eating behaviors
1 Task Last checkin 33 days ago
Goals Progress My History
AT&T 1:56 PM 74%
Goals
Goal
5 Eating behaviors
1 Task Last checkin 33 days ago
Record the main meals you eat. Full portion or restricted portion?
3x a day Last checkin 51 seconds ago
Goals Progress My History
AT&T 1:55 PM 74%
History
Alejandro
Record the main meals you eat. Full portion or restricted portion?
35 days ago
Alejandro: 3 main meals
Alejandro
Practice trusting and having confidence in others
Goals Progress My History

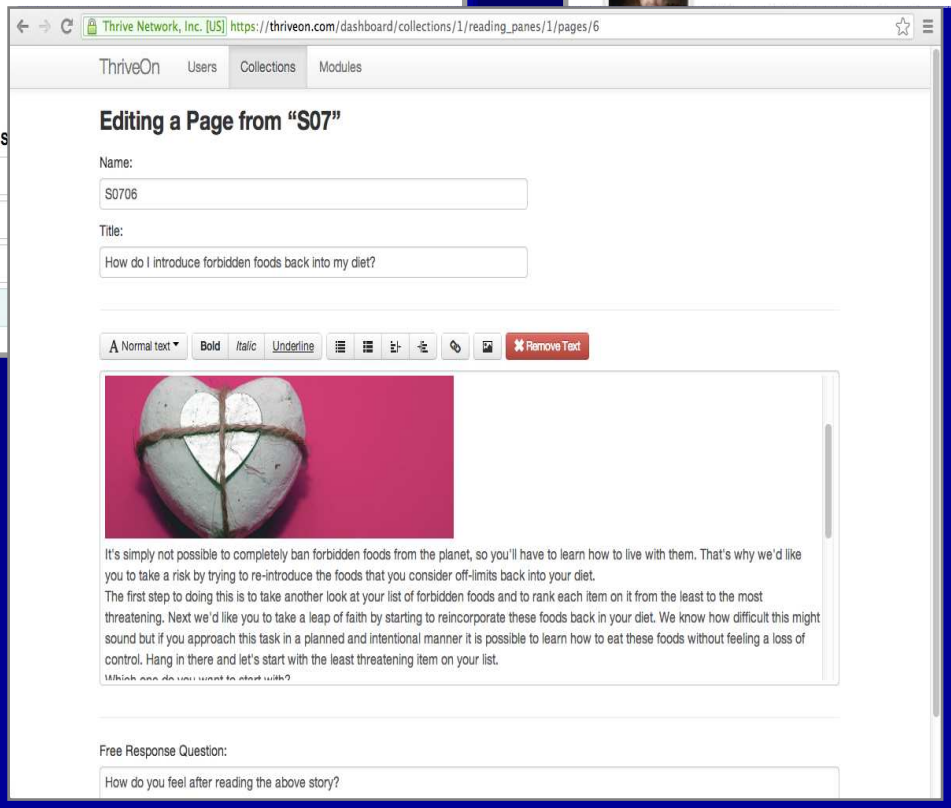
ThriveOn



User Screen



Moderator Dashboard



Content Administration

ThriveOn

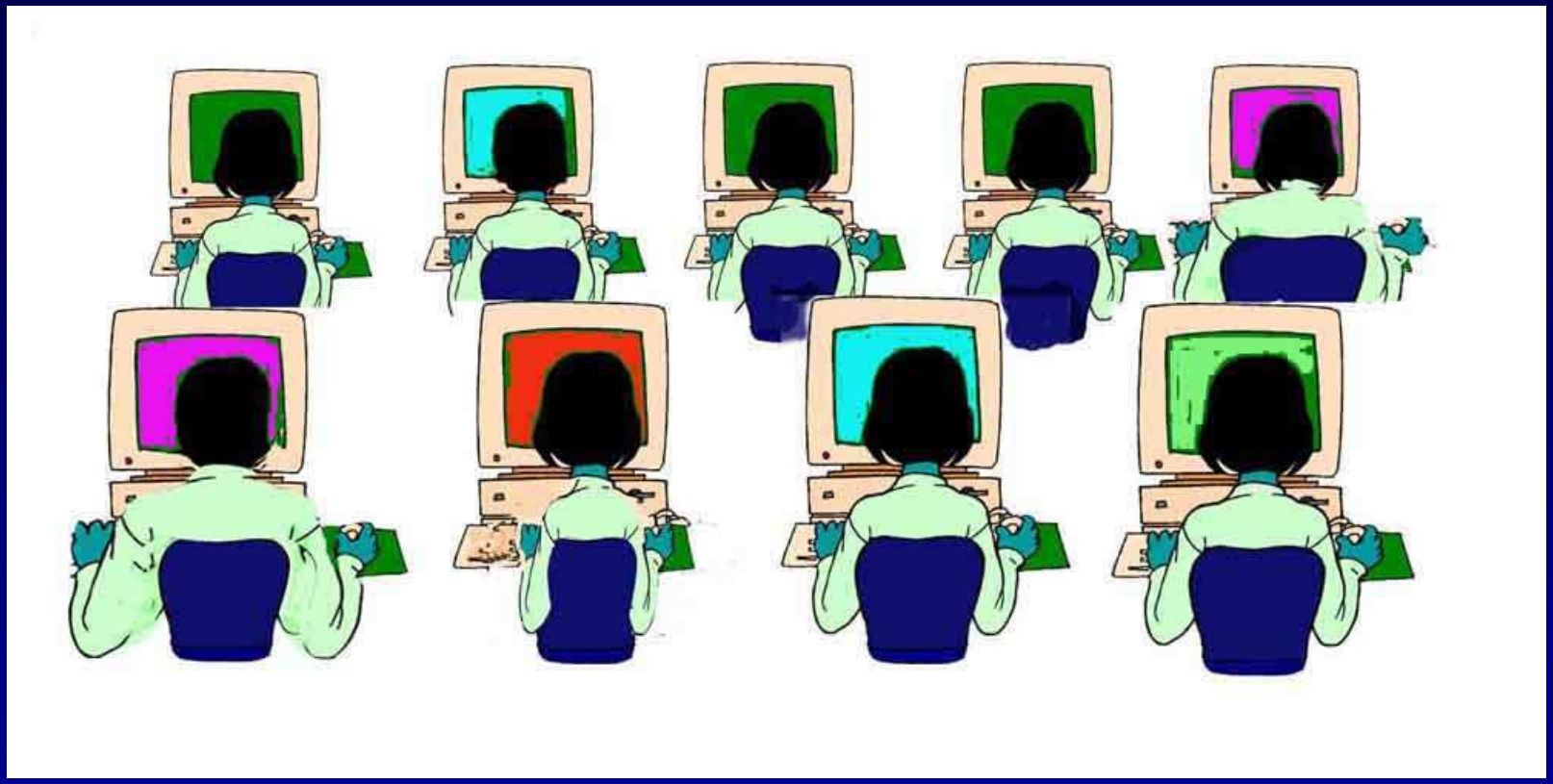
Chapter 4: An Integrated School-Based Obesity/Eating Disorder Screening and Intervention Program

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

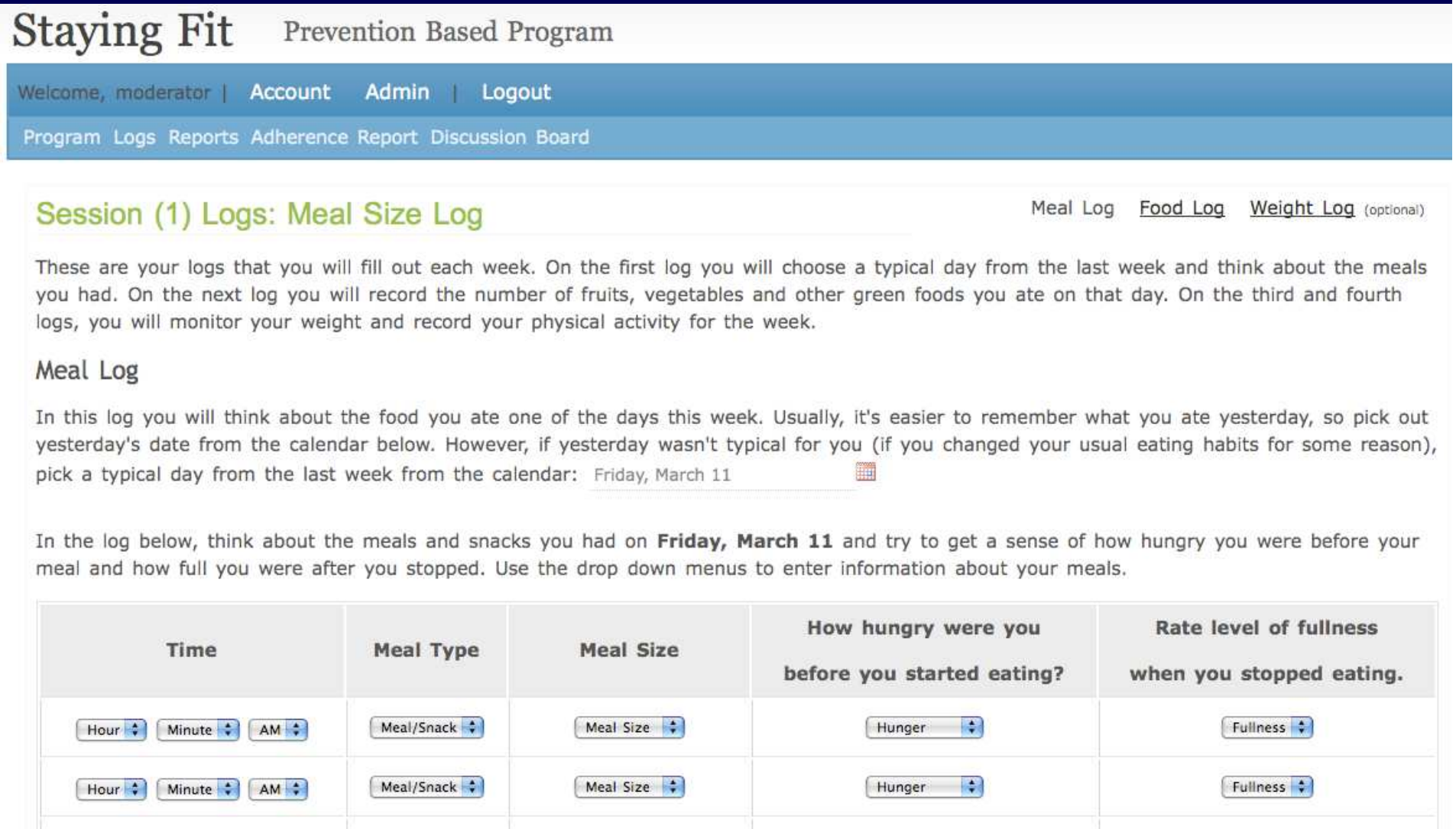
To reach this defined population (all 9th graders) need programs for boys and girls and for those with no risk of EDs or Obesity



At risk of overweight group
High weight and shape concerns group
Referral for anorexia
Healthy weight regulation program only
Other?

- **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.



StayingFit Incorporates a Number of Interactive Monitoring Tools, e.g:

Session (1) Logs: Food Log

Meal Log | Food Log | Weight Log (optional)

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

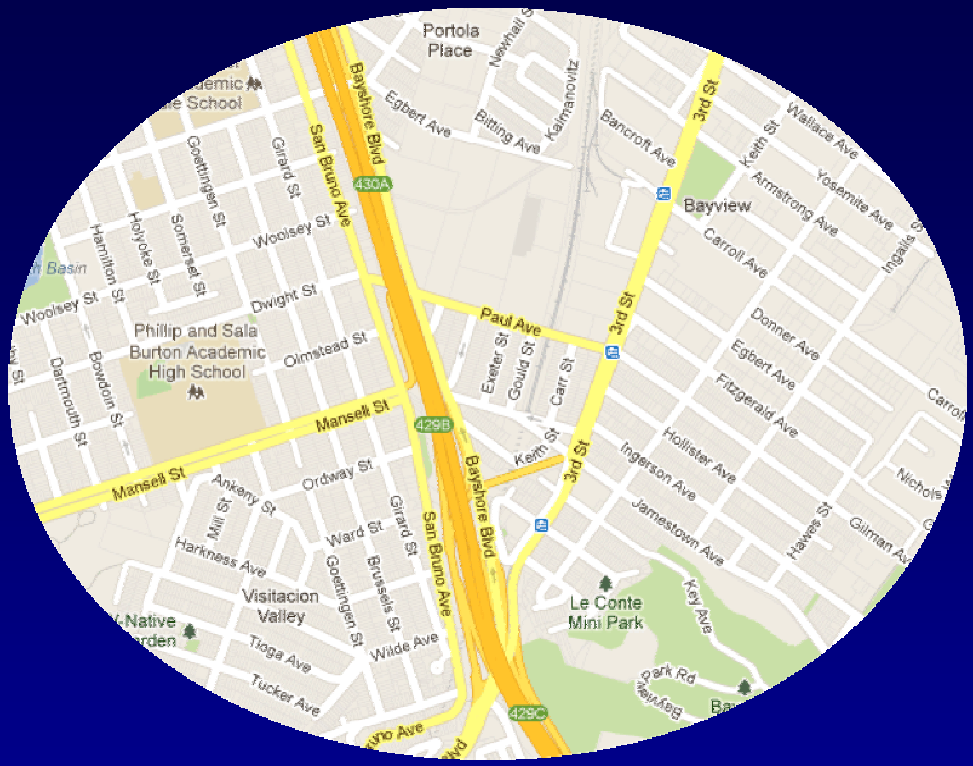
Partner with companies?

Develop a national center?

Add **Health** as a metric/standard for graduation!

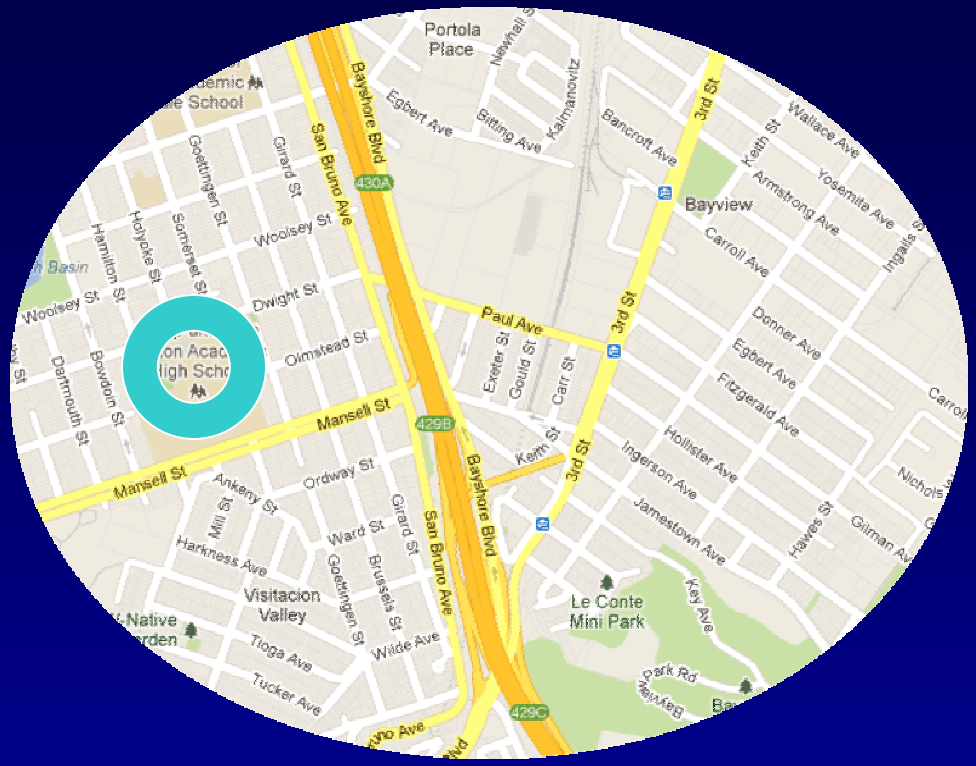
Create school-based StayingFit Communities

Chapter 5: A Dream: StayingFit Communities



StayingFit Communities

Staying Fit:
All 9th graders
in the High School



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**

StayingFit Communities

Staying Fit:
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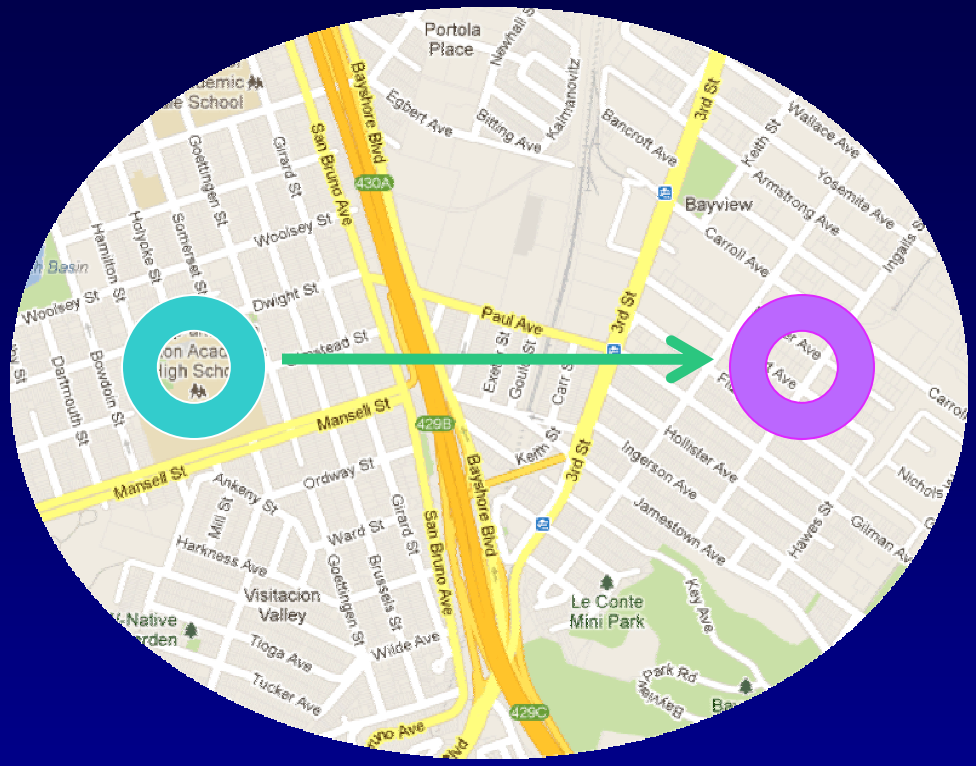
+

YMCA:
Facility for
Exercise
Follow-up



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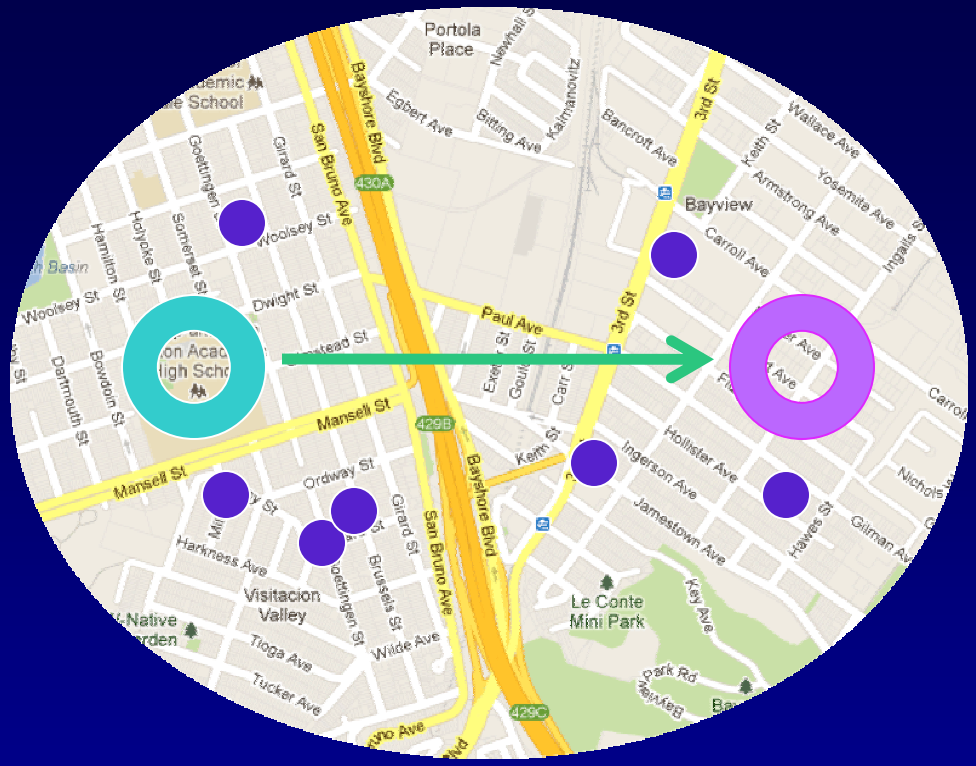
+ **Link to families**



StayingFit Communities

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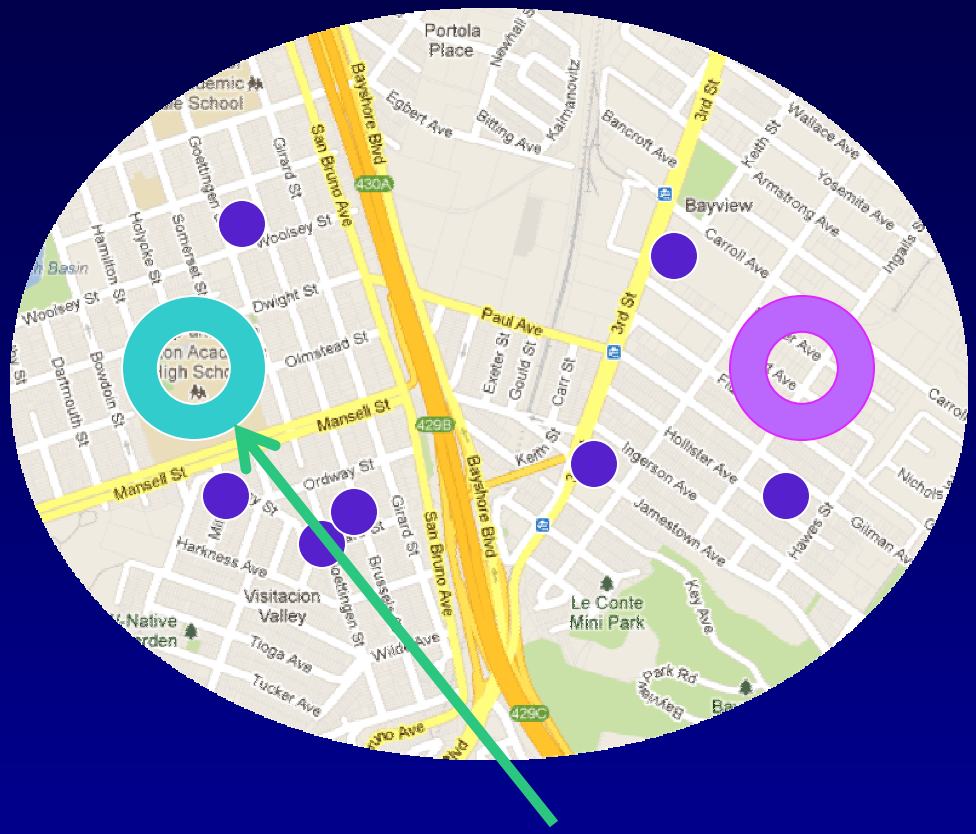
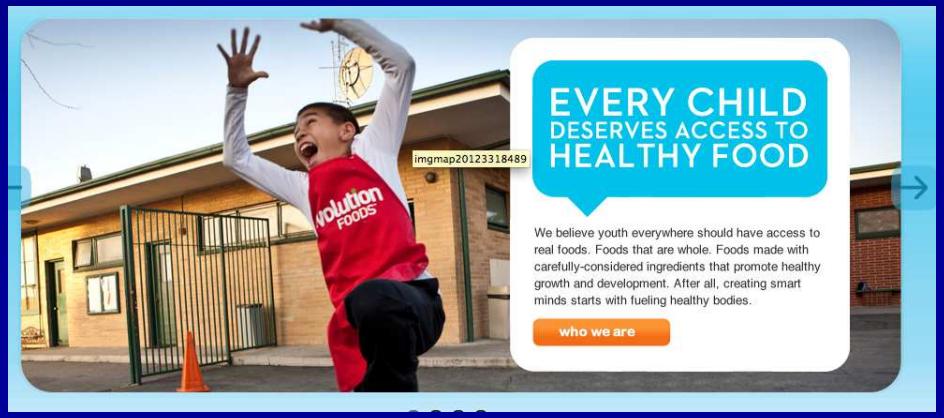
+ **Link to families**

+ Healthier food
in the school





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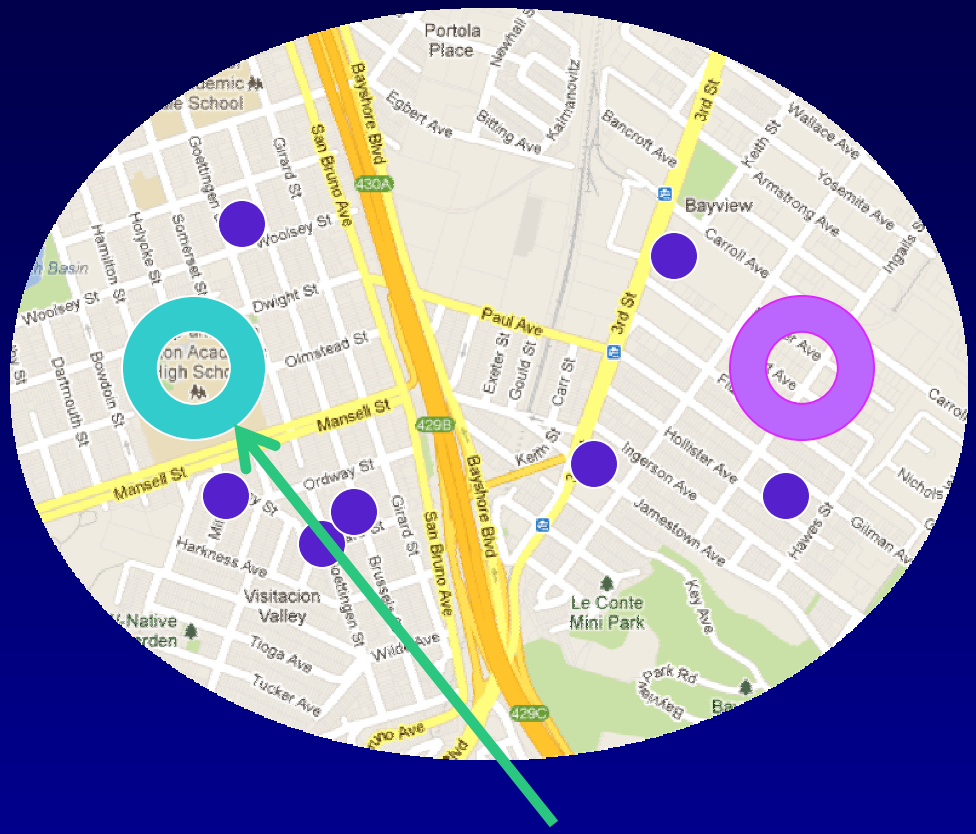

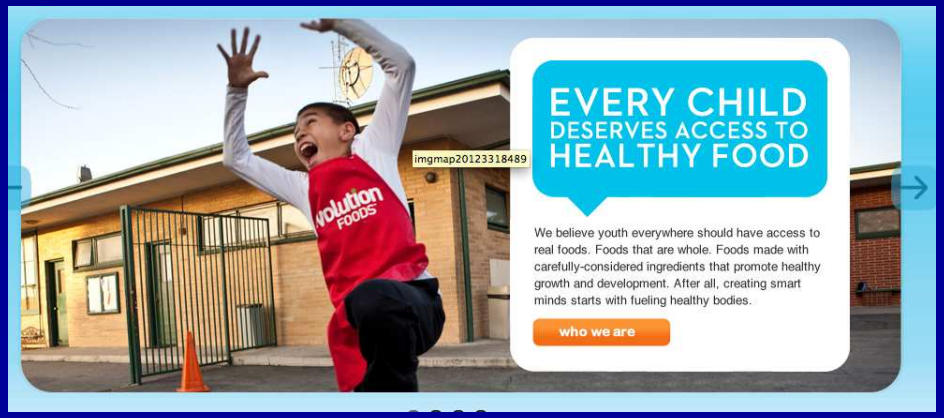

StayingFit Communities

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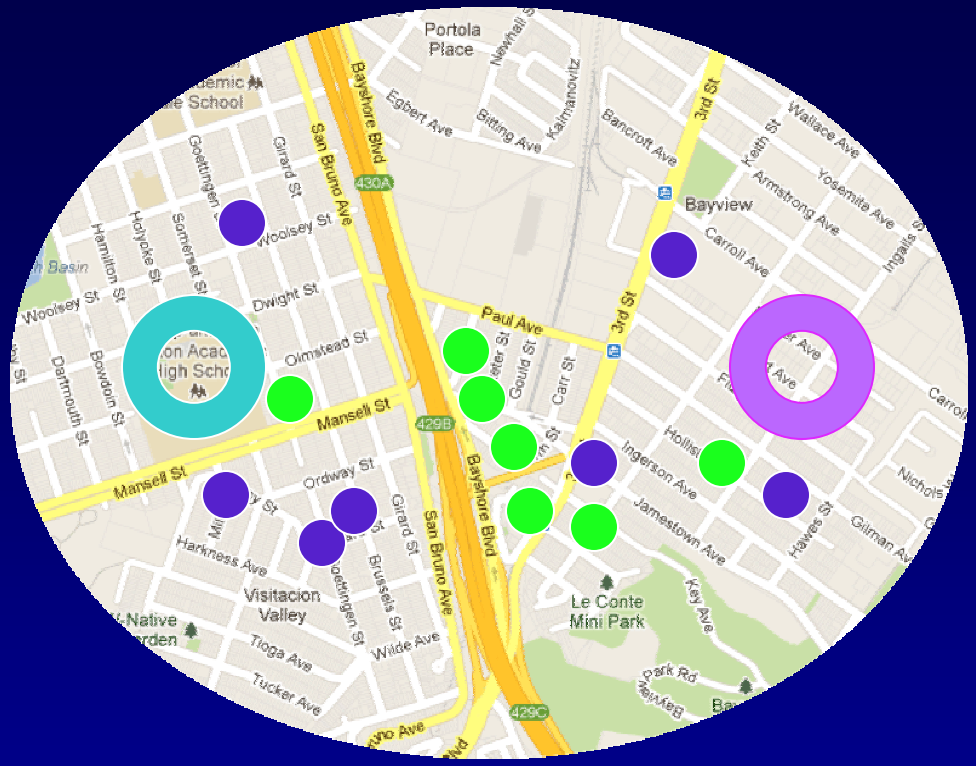
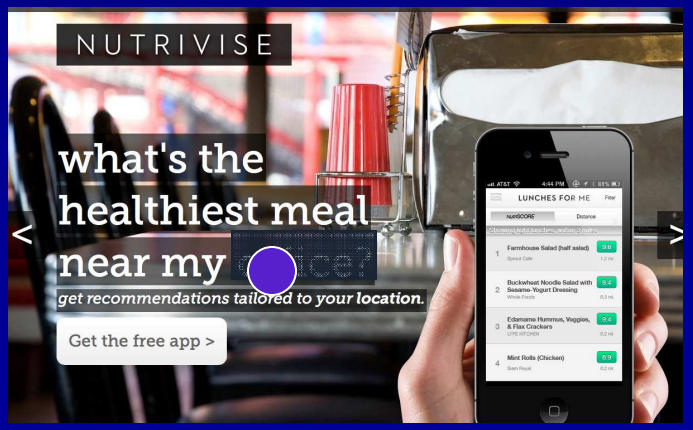
+ Healthier food
in the school

+ Knowledge about
healthier meals





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revolution® FOODS

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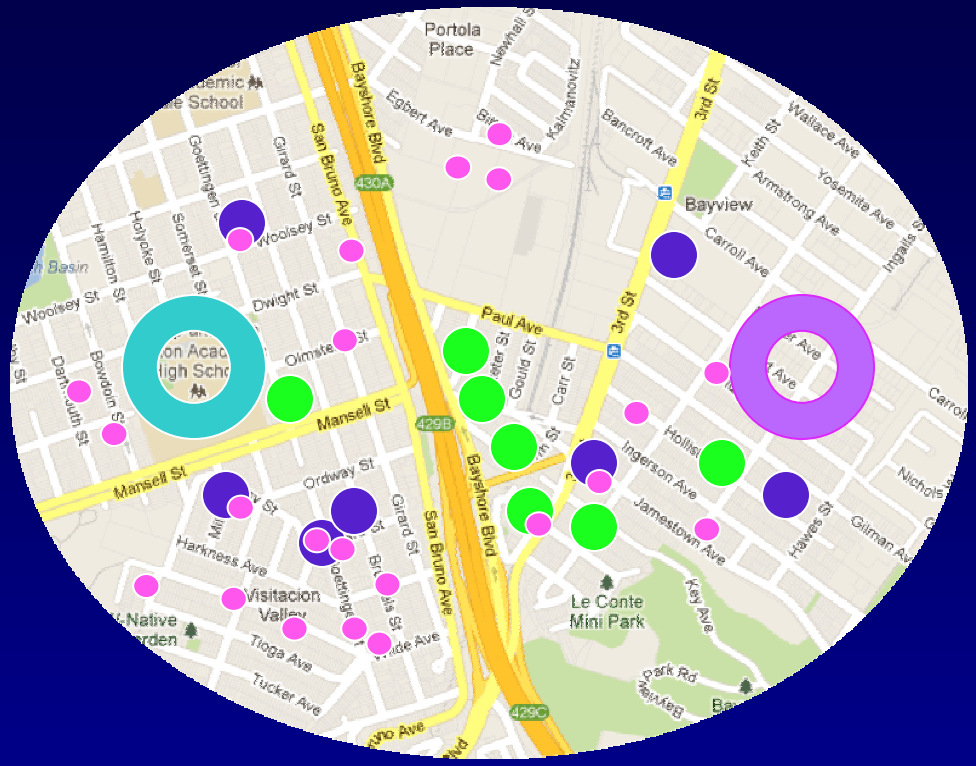

Individuals linked
through social
Networks/database

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**

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!