Leveraging Technology for the Delivery of Smoking Cessation Interventions

William T. Riley, Ph.D.

National Heart, Lung, and Blood Institute

A Brief History of Technology Applied to Health Behavior Interventions

1970s: Manualized Counseling

1980s: Video; Computerized Contacts

1990s: Internet, Tailored Print and Web

2000s: Interactive Web, mobile/wireless

2010s: Social Networking, smartphones

Why the Excitement?

- Engagement (novelty, graphics)
- Existing infrastructure incorporated in daily routine
- Standardized implementation
- Tailored, expert system personalization
- No time and space constraints
- Scalability
- Frequent or real-time monitoring
- Interactivity
- Rapidly expanding possibilities

File   Edit   View   Favorites   Tools   Help

Back

Address   https://www.freeclear.com/webcoach/plans/quit/default.aspx   Go   Links

| MY QUIT PLAN | MY QUIT STATS | MY LIBRARY | DISCUSSION FORUMS |

FREE & CLEAR

My Quit Home Page

Quit Exercises

Healthy Habits

Triggers & Coping Skills

Substitutes & Distractions

Practice Quitting

Manage My Weight

Coping With Stress

Learning from Past Quit Attempts

Motivational Tools

Cost Savings Calculator

My Reasons to Quit

Friends & Allies

My Quit Calendar

View My Quit Calendar

Contact a Quit Coach

My Quit Plan Home Page

I've quit smoking!   Help

You're Headed in the Right Direction

Good for you for making the decision to quit smoking! Quitting is the best thing you can do for yourself and the people you love. It can be hard work, but with preparation and practice you can be on your way to quitting for good.

Use your Quit Plan to get ready and remember to share it with your Quit Coach.

My Quit Stats   Updated On: 11/26/2007

Money I have spent : $251.16

Cigarettes per day: 10
Planned Quit Date: Nov 16

View Details or Update My Quit Stats

My Quit Plan Exercises

Healthy Habits

Pick healthy habits that will help you quit.

Triggers & Coping Skills

Learn about your triggers to smoke and how to cope with them.

Substitutes & Distractions

Pick substitutions and distractions you'll use instead of smoking.

Practice Quitting

Try out practice quits to prepare you for your Quit Date.

Learning from Past Quits

Learn from your past quit attempts

Manage My Weight

Learn tips for managing your weight while quitting.

Done   Local intranet

Meta-Analyses of Internet-based Smoking Cessation

- ## Shalab & McEwen (2009)
  - 11 relevant trials
  - RR = 1.8 (1.4 – 2.3)
- ## Cochrane Review (2010)
  - 20 relevant trials
  - Inconsistent findings
  - Suggested tailored and frequent contacts are preferable
- ## Myung et al (2009)
  - 9 trials
  - RR = 1.4 (1.13 – 1.72)
  - 9.9% vs. 5.7% abstinent at 1 yr.

Effect of smoking cessation programs vs control in random-effects meta-analysis of randomized controlled trials (RCTs)
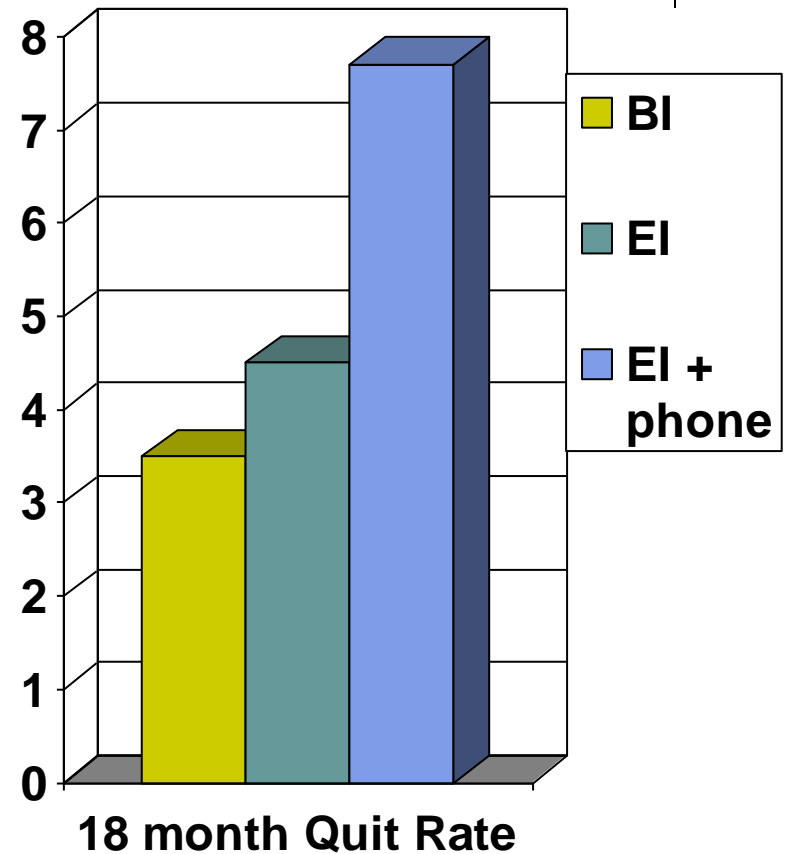
ARCHIVES OF
INTERNAL MEDICINE
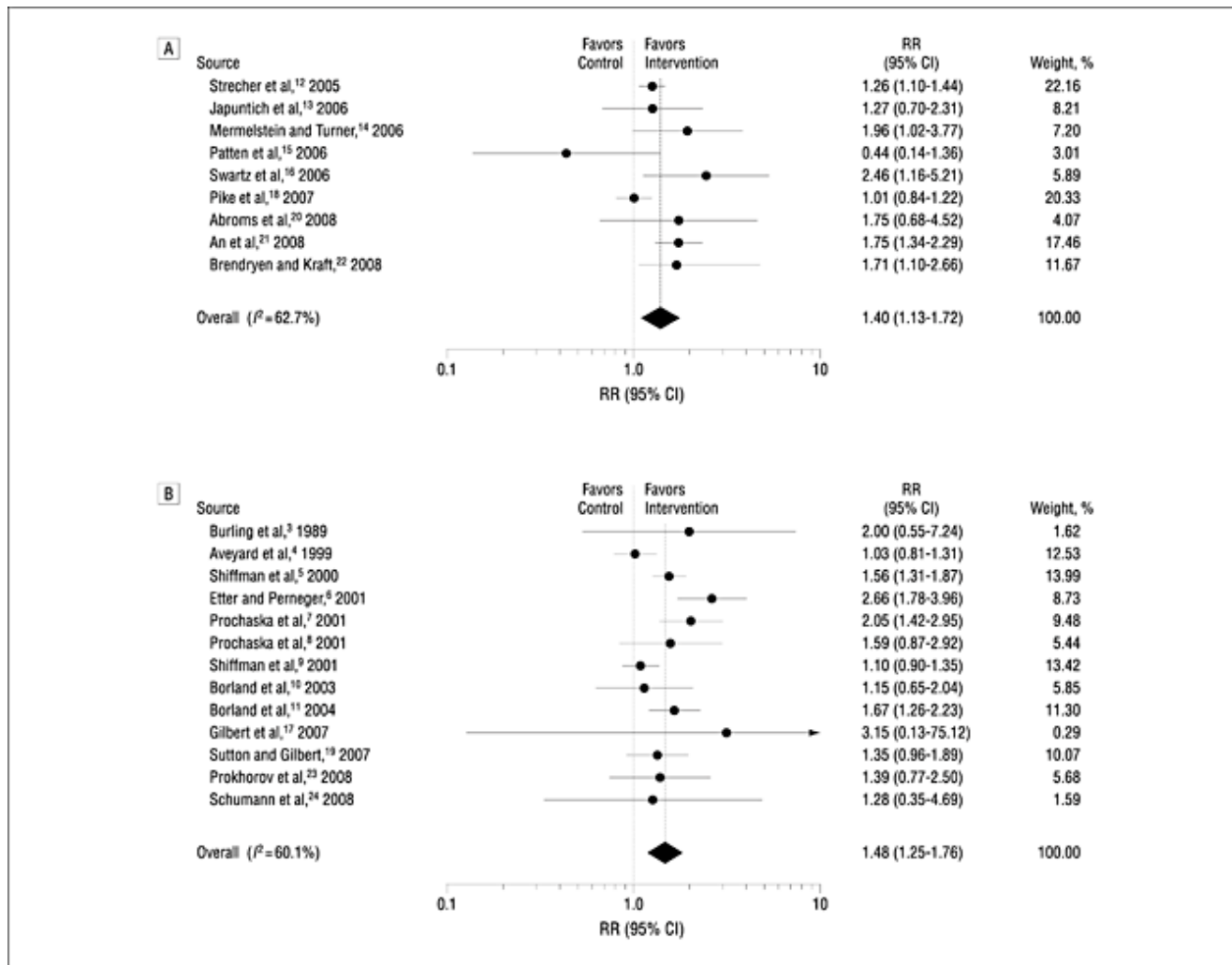
QuitNet Outcomes

- 2005 smokers from almost 100K search engine users
- Randomly assigned
  - Basic Internet
  - Enhanced Internet
  - Enhanced Internet + telephone counseling
- 18 month multiple point abstinence (%)

  - Graham et al (2011) Arch Gen Med, 171, 46-53

Access and Interest

- Survey of 8467 Canadians
- Internet use by:
  - Smokers = 74%
  - Nonsmokers = 81%
- Smokers also used the internet less often than nonsmokers
- 40% of smokers were interested in an internet smoking cessation intervention
  - Cunningham (2008) J Med Internet Res 10, e37

Smoking Cessation Search Strategies

- Search behavior of 650K individuals
- 628 (0.1%) made cessation-related searches
- 76% of these reached a cessation website
- 34% reached "professional sites"
- Top 10

1. cdc.gov
2. whyquit.org
3. quitnet.com
4. quitsmoking.about.com
5. quitsmoking.com

6. cancer.org
7. freedomlasertherapy.com
8. ash.org.uk
9. finalsmoke.com
10. laserconcept.com

Cobb (2010) Am J Prev Med, 38, S429-S432

Utilization of Smoking Cessation Sites

- High satisfaction and 21% quit at 1 mo
- But 1-2 logins per user
  - Women used service more than men
  - Older and heavier smokers used more
    Zbikowski et al (2008) J Med Internet Res, 10, e41

Utilizing Social Networks

- Analysis of QuitNet users showed a weakly connected core similar to most online networks
  - 7500 active members
  - Small number of well-connected members
  - Even smaller number of highly active integrators
  - Core members predominately female, older, and abstinent

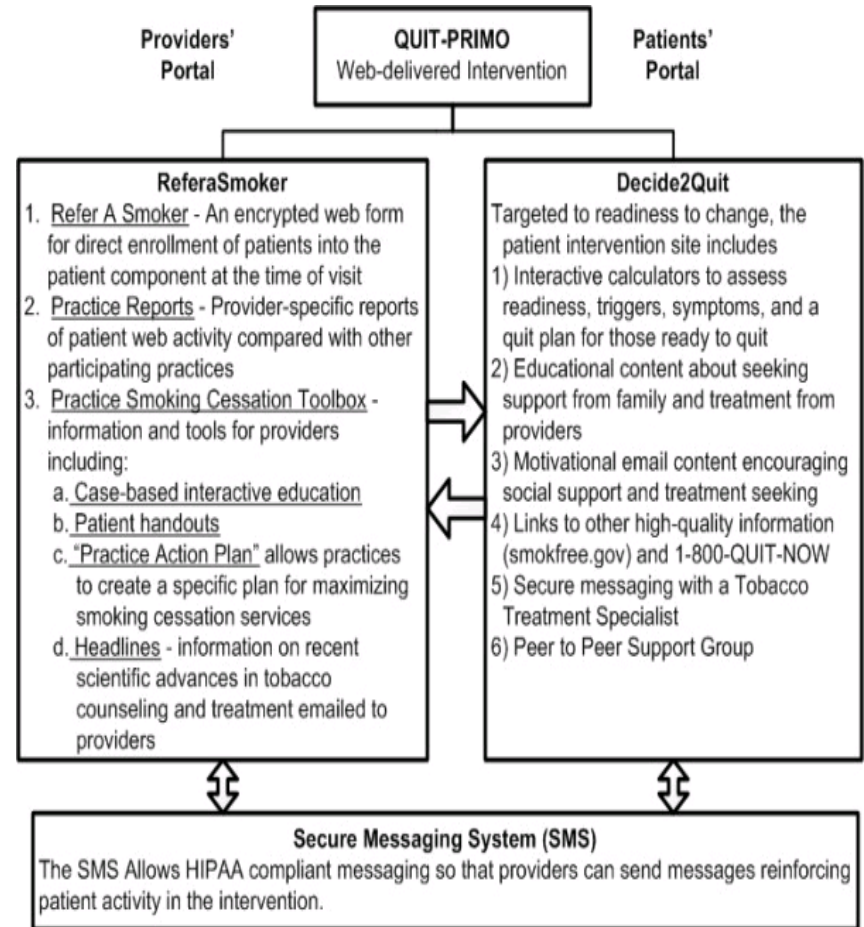# Content of Internet-based Smoking Cessation (Bock et al.,2008)

Guideline Components	Percent Adequate
Advise Users to Quit	21
Personalized Advice to Quit	26
Assess Readiness to Quit	22
Assist with Quit Plan	56
Provide Practical Counseling	69
Provide Intra-tx social support	54
Recommend pharmacotherapy	43
Arrange follow-up	17

Increasing Demand and Use – Physician Referral

- QUIT-PRIMO links:
  - Provider system (ReferaSmoker) &
  - Patient system (Decide2Quit)
    - Houston et al (2010) Implement Science 5, 87

QUIT-PRIMO — Web-delivered Intervention

Providers' Portal / Patients' Portal

ReferaSmoker
1. Refer A Smoker - An encrypted web form for direct enrollment of patients into the patient component at the time of visit
2. Practice Reports - Provider-specific reports of patient web activity compared with other participating practices
3. Practice Smoking Cessation Toolbox - information and tools for providers including:
   a. Case-based interactive education
   b. Patient handouts
   c. "Practice Action Plan" allows practices to create a specific plan for maximizing smoking cessation services
   d. Headlines - information on recent scientific advances in tobacco counseling and treatment emailed to providers

Decide2Quit
Targeted to readiness to change, the patient intervention site includes
1) Interactive calculators to assess readiness, triggers, symptoms, and a quit plan for those ready to quit
2) Educational content about seeking support from family and treatment from providers
3) Motivational email content encouraging social support and treatment seeking
4) Links to other high-quality information (smokefree.gov) and 1-800-QUIT-NOW
5) Secure messaging with a Tobacco Treatment Specialist
6) Peer to Peer Support Group

Secure Messaging System (SMS)
The SMS Allows HIPAA compliant messaging so that providers can send messages reinforcing patient activity in the intervention.

Abstinence Reinforcement via Technology

- Video confirmation of CO reading transmitted to provider who provided monetary incentives (contingency mgmt)
  - Stoops et al. (2009) Drug Alc Depend, 105, 56-62.
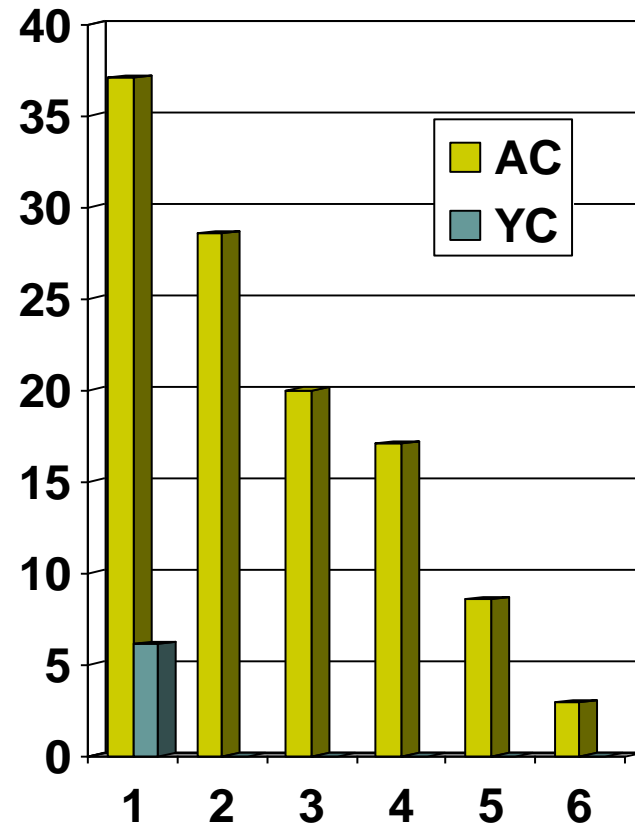
Interactive Voice Response

- Quit line counseling effective (RR = 1.37)
  - Proactive more effective than reactive
  - Dose-response relationship
- Augmenting reach with IVR
  - Automated calls at specified times
  - Assess smoking status, provide limited advice
  - Personal phone contact as requested or based on assessment data
  - In discharged CHD patients, 1 yr. abstinence rates of 46% vs. 35% in usual care quit line referral

Mobile Phone Interventions

Study	Quit Rate
Obermayer et al (2004)	17% at 6 wks
Rodgers et al (2005)	28% vs. 13% at 6 wks
Riley et al (2008)	42% at 6 wks
Whitaker et al (2008)	53% at 4 wks
Brendryen & Kraft (2008)	38% vs. 24% at 12 mos
Brendryen et al (2008)	20% vs. 10% at 12 mos
Free et al (2009)	8% vs. 6% at 6 mos

The College Smoking Project

CSP Homepage

CSP

- **CSP Home**
- **User login**
- **Support login**
- **New users**
- **About PICS**
- **About CSP**
- **Education Modules**

Welcome to
The College Smoking Project

The College Smoking Project (CSP) was funded with a grant from the National Cancer Institute.
For further information on grants from the National Institute of Health, go to
http://www.nih.gov

Copyright (C) Personal Improvement Computer

The College Smoking Project

Bill Riley's CSP Page

Smoking History

Using the calendar below, enter the number of cigarettes you smoked each day for the last 14 days, beginning with yesterday and working back.

Remember to consider any special events or changes in your normal routine which may have affected your smoking.

This information will be used to determine not only your mean smoking level but what days of the week you tend to smoke more so be as specific as possible.

Last week Day/Smokes		Two week ago Day/Smokes	
Thursday, 5/27/2004	Smokes: 15	Thursday, 5/20/2004	Smokes: 12
Wednesday, 5/26/2004	Smokes: 12	Wednesday, 5/19/2004	Smokes: 14
Tuesday, 5/25/2004	Smokes: 14	Tuesday, 5/18/2004	Smokes: 15
Monday, 5/24/2004	Smokes: 16	Monday, 5/17/2004	Smokes: 20
Sunday, 5/23/2004	Smokes: 20	Sunday, 5/16/2004	Smokes: 23
Saturday, 5/22/2004	Smokes: 21	Saturday, 5/15/2004	Smokes: 22
Friday, 5/21/2004	Smokes: 23	Friday, 5/14/2004	Smokes: 21

🗋   🌐 Internet

🏁Start || 🗎 ⬤ 🕐 ⊙ ⓞ | 🗋 Inbox - Ou... | 🖼 Microsoft P... | 🗎 Microsoft ... | 🗎 Smoking Hi... | 🔍 Goog 🎁 ▾ ◀◎🔋🔅🔁🕐🎵 1:18 PM

File   Edit   View   Favorites   Tools   Help

Back   Search   Favorites   Media

Address http://www.mquit.com/CSP/csp_schedRisk.aspx?sel=2

CSP Home

Logout

My CSP Home

Progress Report

Support Messages

About PICS

About CSP

Education Modules

Copyright (C) Personal
Improvement Computer
Systems (PICS) 2003.

This site was last modified
on 1/20/2003

Assessing Smoking Risk Situations

Below is a list of high risk smoking situations. Next to each, rate how strong you crave a cigarette. Click the continue button at the bottom of the page when you are finished.

Eating & Drinking

Situation	Craving
After breakfast	Medium
After lunch	Low
After dinner	High
Drinking beer	Very High
Drinking coffee	Medium
Eating a snack	None

Socializing

Situation	Craving
With other smokers	High
At a party	High
In a bar	High
On the phone	None

Leaving non-smoking situations

Situation	Craving
Wake up	High
In a movie	Medium
Leaving work	High
Leaving class	Low

Being bored or relaxing

Situation	Craving
In the car	Low
In my room	Low
Studying	None
Watching TV	None
Listening to music	None

Continue

Done   Internet

Start   Inbox - Ou...   Microsoft P...   Microsoft ...   Rate Risk -...   1:22 PM

File   Edit   View   Favorites   Tools   Help

Back | Search | Favorites | Media

Address http://www.mquit.com/CSP/csp_schedAlertView.aspx?sel=2

Education Modules

Eating & Drinking

Edit	Situation	Craving	Status	Time(s)	Day(s)
Edit	Drinking beer	Very High	On	4:00PM	Thu, Fri
			On	7:00PM	Sat, Sun
Edit	After dinner	High	On	6:00PM	Mon, Tue, Wed, Thu, Fri, Sat, Sun
Edit	Drinking coffee	Medium			
Edit	After breakfast	Medium			
Edit	After lunch	Low			
Edit	Eating a snack	None			

Socializing

Edit	Situation	Craving	Status	Time(s)	Day(s)
Edit	With other smokers	High	On	8:00PM	Tue, Thu
Edit	At a party	High	On	10:00PM	Fri, Sat
Edit	In a bar	Medium			
Edit	On the phone	None			

Leaving non-smoking situations

Edit	Situation	Craving	Status	Time(s)	Day(s)
Edit	Wake up	High	On	8:00AM	Mon, Tue, Wed, Thu, Fri, Sat, Sun
Edit	Leaving work	Medium			
Edit	In a movie	Medium			
Edit	Leaving class	Low			

Being bored or relaxing

The College Smoking Project

Bill Riley's CSP Page

CSP Home

Logout

My CSP Home

   Progress Report

   Support Messages

About PICS

About CSP

Education Modules

Quit Date

Using the calendar below, click a day in the next month for your quit date. Based on your smoking pattern, the days when you smoke the least are Fri and Mon . In addition to a day when you smoke the least, pick a time when you do not think you will have much pressure on you.

<		June 2004				>
Mo	Tu	We	Th	Fr	Sa	Su
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	1	2	3	4
5	6	7	8	9	10	11

My quit date is: 6/2/2004

OK

Copyright (C) Personal

Support Network

- Users have the option of specifying support persons for their program by creating a user name and password for each.

- The support person may log on the web site to view the user's progress in quitting smoking.

- E-mail messages prompt the support person to leave messages to encourage the user's progress.

- The educational modules contain tips on how to encourage and support the individual.

File   Edit   View   Favorites   Tools   Help

Back | Search | Favorites | Media

Address http://www.mquit.com/CSP/csp_progress.aspx?sel=2&sub=1   Go   Links

Bill Riley's CSP Page

CSP

CSP Home

Logout

My CSP Home

Progress Report

Support Messages

About PICS

About CSP

Education Modules

Copyright (C) Personal
Improvement Computer
Systems (PICS) 2003.

This site was last modified
on 1/20/2003

Bill Riley's Progress Report

Days remaining to quit date: 5

Bill Riley- Progress Chart
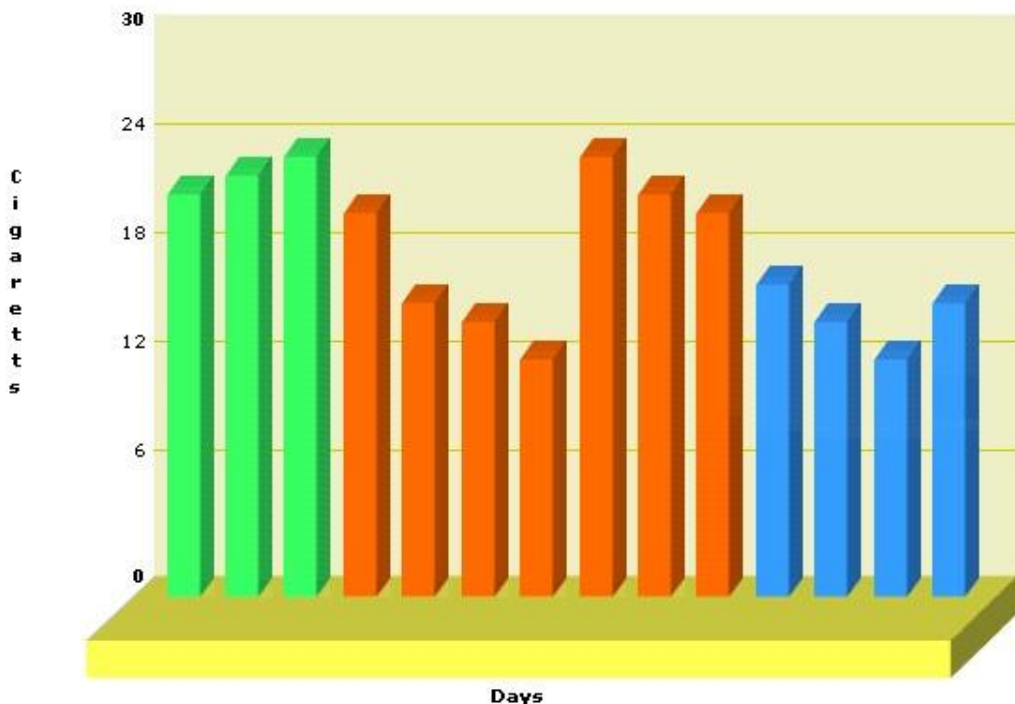
Cigaretts (y-axis)

Days (x-axis)

Internet

Start | Inbox - Outlook... | Microsoft Powe... | Microsoft Word ... | Progress Repor... | Goog   1:41 PM

Text Messages

- Preparation Stage:
    - Message associated with likely situation: "If you typically experience cravings after a meal, try getting up from the table and taking a walk."
    - Reminders of days to quit day
    - Encouragement to seek out support
    - SOS: On demand text messaging support
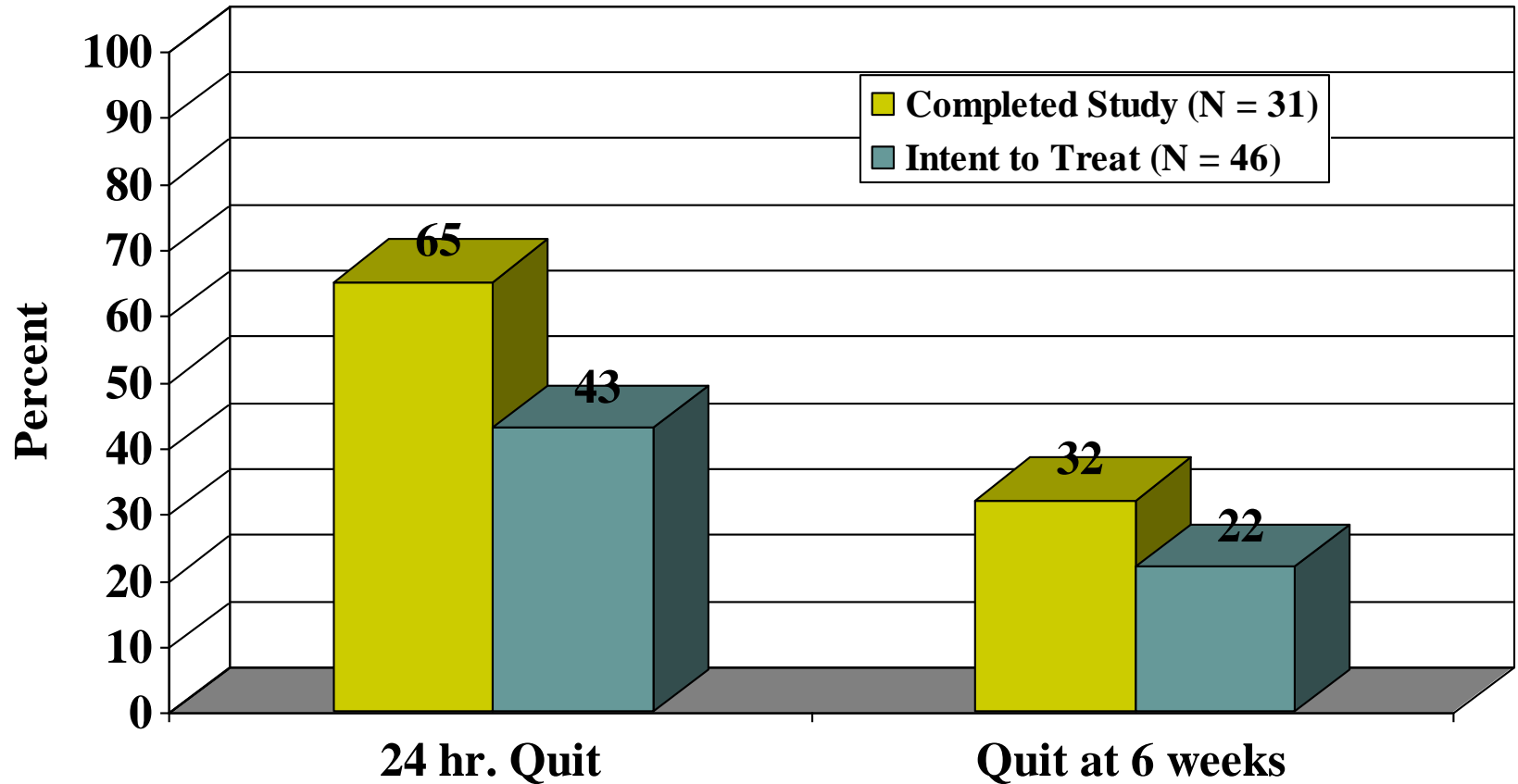
Text Messages

- Action (Quit) Stage:
    - Multiple messages throughout the day
    - Encouragement to remain quit and tips to deal with cravings and withdrawal
    - SOS Messages
    - Automatic contact to support people

Text Messages

- Maintenance (Relapse Prevention) Stage:
  - Start of day contact with days quit
  - Gradually decreasing number of messages each day as abstinence maintained
  - Messages timed in advance of high risk situations
  - Provided relapse prevention strategies
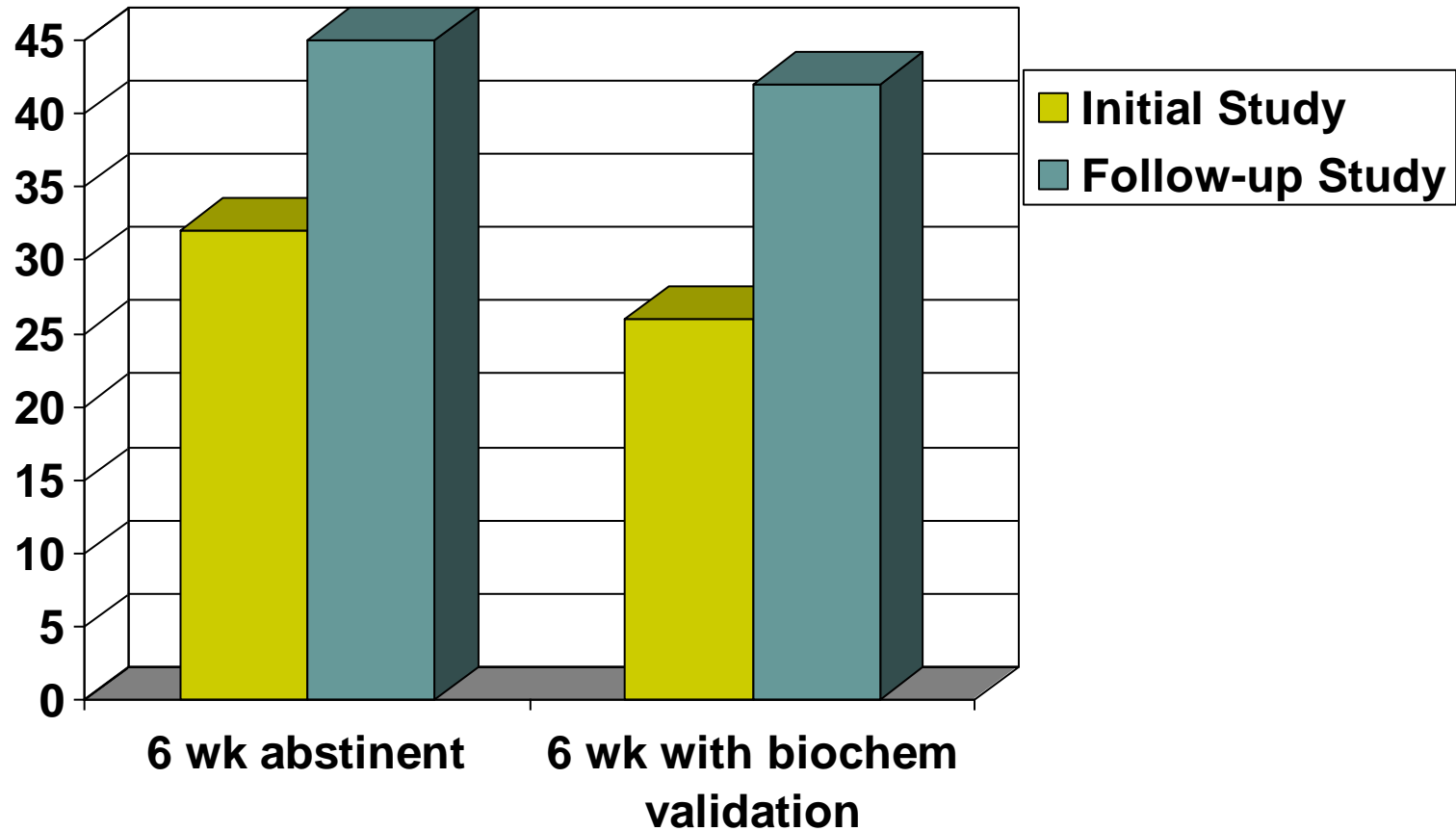
Percent Quit at 6 weeks

Additional Results

- Only 29 of 46 initialized the program
- Of those who actually received text messages, the quit rate was 34% (28% validated)
- Of those still smoking:
  - cigarettes per week decreased from 76 to 32
  - NDSS scores reduced significantly

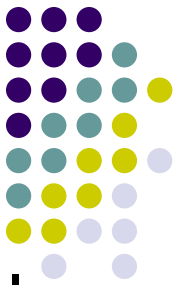# Follow-up Study with Proactive Initiation

Happy Ending Brendryen et al (2008)

- Strong theoretical basis (SCT, Self-Reg)
- Multicomponent: web, sms, email, IVR
- Intensive contacts
- One year quit rates:
  - 22.3% vs. 13.1%
  - 20% vs. 7%

Mobile Reducing the Digital Divide

Demographics of internet users

Below is the percentage of each group who use the internet, according to our May 2010 survey. As an example, 79% of adult women use the internet.

	Internet users
Total adults	**79%**
Men	79
Women	79
Race/ethnicity	
White, Non-Hispanic	80%
Black, Non-Hispanic	71
Hispanic (English-speaking)	82
Age	
18-29	95%
30-49	87
50-64	78
65+	42
Household income	
Less than $30,000/yr	63%
$30,000-$49,999	84
$50,000-$74,999	89
$75,000+	95
Educational attainment	
Less than High School	52%
High School	67
Some College	90
College +	96
Community type	
Urban	81%
Suburban	82
Rural	67

Source: The Pew Research Center's Internet & American Life Project, April 29-May 30, 2010 Tracking Survey. N=2,252 adults, 18 and older, including 744 cell phone interviews. Interviews were conducted in English. Margin of error is ± 2%.

Pew Internet
Pew Internet & American Life Project

Leapfrogging the Digital Divide

- 285 million US mobile phone users
- 2/3 of adults worldwide use mobile phones
- Disproportionately higher use in US minority groups
- Higher use in younger populations, including risk taking adolescents

Pew Internet

Mobile Intruding in Smokers' Lives

- Assess status in real-time
  - Smoking behavior
  - Triggers
  - Intention and motivation
  - Mood
- Intervene:
  - Frequently throughout the day
  - In the context of the behavior
  - Based on prior assessment information

Cautionary Tale

- In 1950s, mobile neighborhood TB screenings were innovative

- But the added salience and convenience did not substantially increase screenings

- Researchers learned that perceived threat, benefit, and barriers of getting screened were more critical than the innovative delivery

- Led to the Health Belief Model and the various health behavior theories that followed