Using Tailored Messaging to Improve Uptake of Recommended Health Behaviors

CRISP Seminar Series, November 2013
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Conflict of Interest

- Dr. Dempsey serves on advisory boards for Pfizer and Merck.
- Neither had any role in this research
- Dr. Dempsey’s research is not funded by these companies.
Topics for Today

- Tailored Messaging – what is it?
- Evidence on Effectiveness
- How do tailored message interventions work?
- Examples of Tailored Message Interventions
- Implementation & Dissemination Issues
Tailored Messaging – What is it?
Tailoring

- Refers to any number of methods for creating communications that are individualized for the receiver
Targeted vs. Tailored Messages

- Targeted – provides information specific to subpopulations
  - “Infants are at highest risk of dying from pertussis”

- Tailoring – provides information specific to individuals
  - “Judy, did you know that 6 month old infants like Jeremy are 10 times more likely to die of pertussis than any other age group?”
Goals of Tailoring

Influence Information Processing

- Grab attention
- Create emotional response
- Engage internal processing

Enhance Message Impact

- Engage theory-based constructs that mediate behavioral intention/behavior
  - Self-efficacy
  - Attitudes
  - Normative perceptions

Adapted from http://chcr.umich.edu/mts/presentations/Tailored%20Messages%20101.pdf
Why Tailor?

- When individuals perceive materials as more personally relevant it:
  - Enhances their motivation to act on information
  - Increases their “sensitivity” to the arguments being presented
  - Increases persuasiveness of the information

Based on concepts from the Elaboration Likelihood model (among others)
Addresses Multi-Level Factors

Health behavior predictors:

- Demographics
- Physical/mental/functional health
- Problem solving approach
- Active patient orientation
- Clinician-patient interaction
- Motivation to change
- Social support
- Barriers
- Self-efficacy

Health-related behavior

Adapted from http://chcr.umich.edu/mts/presentations/monday/VictorStrecher220080804.pdf
Components of Tailoring 1

- **Personalization**
  - Use person’s name
    - “Jen, it seems like you are worried about vaccine side effects”
  - Point out information is customized
    - “Based on the information you provided, it sounds like one of your main motivations for quitting smoking is to make your family safer.”

- **Contextualization**
  - Matched Pictures
    - “Since you live in Denver, you might want to try the YMCA in Stapleton for exercise classes in your area”

Components of Tailoring 2

- **Feedback**
  - Descriptive - “You indicated you don’t think your asthma is under good control”
  - Comparative – “You are eating 2 more servings of fruits and vegetables than when you first enrolled.”

Components of Tailoring 3

- **Content Matching**
  - Assesses the most important issues for each person and produces messages around these particular topics
  - Seeks to minimize the “search for information” process

Evidence on Effectiveness
Does Tailoring Matter? Meta-Analytic Review of Tailored Print Health Behavior Change Interventions

Seth M. Noar, Christina N. Benac, and Melissa S. Harris
University of Kentucky

Although there is a large and growing literature on tailored print health behavior change interventions, it is currently not known if or to what extent tailoring works. The current study provides a meta-analytic review of this literature, with a primary focus on the effects of tailoring. A comprehensive search strategy yielded 57 studies that met inclusion criteria. Those studies—which contained a cumulative $N = 58,454$—were subsequently meta-analyzed. The sample size-weighted mean effect size of the effects of tailoring on health behavior change was found to be $r = .074$. Variables that were found to significantly moderate the effect included (a) type of comparison condition, (b) health behavior, (c) type of participant population (both type of recruitment and country of sample), (d) type of print material, (e) number of intervention contacts, (f) length of follow-up, (g) number and type of theoretical concepts tailored on, and (h) whether demographics and/or behavior were tailored on. Implications of these results are discussed and future directions for research on tailored health messages and interventions are offered.

Keywords: tailored message, health communication, behavior change, theory, intervention

Print-Based Tailored Materials

- Meta-analysis of 57 studies
  - Better than untailored in most cases, but effect sizes small → moderate ($r=0.05 – 0.20$)
  - Impacts females > males
  - No differences based on age, race, or education
  - Dose effect
  - Better effect with more constructs for tailoring
  - Pamphlets > letters > manuals/booklets
  - Pap testing, smoking cessation, mammography, diet, exercise

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Favors Control  |  Favors Tailoring
-1.00 | -0.50 | 0.00 | 0.50 | 1.00
Meta-Analysis of Web-Based Materials

A Meta-Analysis of Web-Delivered Tailored Health Behavior Change Interventions

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Meta-Analysis of Web-Based Materials

- Meta-analysis of 40 studies
  - Tailored better than untailored and also than “usual care”
  - Many websites included other communication modalities (video, interactive tools)
  - No waning of impact over time
  - Single = multiple health behaviors
  - Better when targeted to general public than a specific population (i.e. chronically ill)
  - Larger effect sizes than print materials
Effectiveness - Click 2 Quit
### C2Q Overall Effectiveness

**Ten-Week Continuous Abstinence (%) by Treatment Group at Twelve-Week Follow-Up.**

<table>
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<tr>
<th></th>
<th>Tailored</th>
<th>Untailored</th>
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<th>Odds Ratio (95% CI)</th>
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<td>10-week continuous abstinence</td>
<td>22.8</td>
<td>18.1</td>
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<td>1.34 (1.13-1.58)</td>
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<td>(Intent-to-treat)</td>
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<td>10-week continuous abstinence</td>
<td>55.4</td>
<td>43.3</td>
<td>&lt;.0001</td>
<td>1.63 (1.24-2.13)</td>
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<td>(Per-protocol)</td>
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Subgroup Effectiveness

CQ2 is differentially effective among smokers with:

Tobacco-related illness*: Ten-Week Continuous Abstinence (%) by Treatment Group at Twelve-Week Follow-Up stratified by illness status (n=1487; Wald Chi-Square for interaction: 3.8; p=.05).

*Percentage abstinence by subgroup:
- No Tobacco-related illness: CQP2 52%, Untailored 45%
- Yes Tobacco-related illness: CQP2 56%, Untailored 38%
Subgroup Effectiveness

CQ2 is differentially effective among smokers with:

Frequent alcohol consumption: Ten-Week Continuous Abstinence (%) by Treatment Group at Twelve-Week Follow-Up stratified by alcohol consumed ≥3 times per week (n=1486; Wald Chi-Square for interaction: 6.4; p=.01).
How do Tailored Message Interventions Work?
3 main steps

Data + Set of Rules = Output
What this means really...

Baseline Survey to Assess Tailoring Variables

Tailoring “engine” accesses data to create content from a “message library”

Tailored content is viewed
Examples of Tailoring Variables

- Demographics
- Attitudes and Beliefs
- Prior experiences
- Health values, goals or motivation
- Test results
- Geographic norms
- Stage of change
Message Library

Ties tailoring variables to content

- Barrier 1  ➔  Message 1
- Barrier 2  ➔  Message 2
- Barrier 3  ➔  Message 3
Specific Examples

- HPV vaccines are not safe
  - “Vaccines and short term health effects”
- Giving the HPV vaccine would encourage my daughter to have sex
  - “Giving the wrong message about sex”
- My daughter is too young for her to need a vaccine against an STD
  - “Too young for the vaccine?”
Tailoring Engine

The Michigan Tailoring System

The Michigan Tailoring System (MTS) is an open source software package for writers who want to develop tailored content — content designed specifically for an individual based on data known about that individual.
### MTS System

![MTS Workbench](image)

#### Message Editor

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<th>Options</th>
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<th>Message</th>
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</tr>
<tr>
<td>59</td>
<td>block</td>
<td>tag div class: text</td>
<td></td>
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<tr>
<td>62</td>
<td>text</td>
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<td>Many mothers worry that the HPV vaccine can cause health problems for their daughter in the future.</td>
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Are HPV Vaccines Safe?

It sounds like you are worried the HPV vaccine could cause $Daughter_Name$ health problems in the future.

Many mothers worry that the HPV vaccine can cause health problems for their daughter in the future.

It may be helpful to know that:
Depth of Tailoring

- **Light = “Block tailoring”**
  - Paragraph level

- **Moderate**
  - Paragraph level with some individual sentences tailored

- **Deep = “Micro tailoring”**
  - Most sentences or even parts of sentences tailored
Low vs. High Tailoring Example

Low
Once you quit smoking, you feel that you might be tempted to light up when you are stressed. Managing stress is a valuable skill to have. We want to help you make sure that cigarettes are no longer a stress “solution” you want to reach for.

This section of the program provides valuable resources and healthy ways to help you cope with a variety of things life may throw at you.

High
When you rated the triggers that might tempt you to light up once you quit, stress was at the top of your list. You also told us that you have a lot of stress in your life right now and that you don’t always cope well with it.

Based on this, you may want to spend a little extra time in this section of your program. It highlights many ways to manage stress that fit well with both your work and family life.

Adapted from http://chcr.umich.edu/mts/presentations/Tailored%20Messages%20101.pdf
Low Depth Tailoring

Tailoring Variables Used:

Welcome back Brian! As we come to the end of your Project Quit guide, we’d like to leave you with some words of advice from Scott. Like you, he was ready to quit smoking but faced many challenges. Here’s his story.

Why did you decide to quit?
I had several good reasons for quitting. First, I needed to save money for a new car and knew I was throwing a lot of money away buying cigarettes. Second, I didn’t like leaving the fun when I’d have to step outside to smoke at places that didn’t allow smoking inside. It made me feel like an outcast. Overall, I guess I just finally had enough.

How did you prepare for the change?
Well, I had read that you have to change things that you do and how you think to stop smoking. So, about two weeks before I quit, I decided to track all my cigarettes. Every time I wanted one, I’d first write down why I wanted it and when I wanted it. Then I’d write why I wanted to quit.

Did you do anything different as your quit day approached?
Yes. I usually smoked about a pack a day, but started cutting a few out each day just to see how I’d do. I’d play a game and would try to come up with 5 things I could be doing instead of sitting there idle, potentially smoking. Once I came up with the list, I could either reward myself and have a cigarette, or just go do something from the list. I also began to skip my “dessert” cigarette before bed.

Did tracking why you smoked help?
Definitely. When I looked back over what I had tracked about my smoke breaks, what stood out the most was that I didn’t always have a good reason to be smoking. I was just smoking to smoke.

Did you ask for support?
High Depth Tailoring

Tailoring Variables Used:

- Name
- Age
- Gender
- Ethnicity
- Stage of Change
- Marital status
- Smoking status of spouse
- Child in home
- Physically active
- # of cigs smoked
- Barrier
- Job status
- Social Support

Rhonda, as we come to the end of your Project Quit guide, we'd like to leave you with some words of advice from Deb. **Like you, she was** ready to quit smoking but faced many challenges. Here's her story:

**Why did you decide to quit?**
I had several good reasons for quitting. First, we needed to save money to put towards a car that would actually work. Second, my husband **wanted me to**. Third, I didn't like leaving the fun when I'd have to step outside to smoke at places that didn't allow smoking inside. It made me feel like an outcast. Plus, it wasn't really fair to the kids for me to tell them not to smoke while I did. "Do as I say, not as I do" isn't such a great example to set.

**How did you prepare for the change?**
I had heard that you have to change what you do and how you think to stop smoking, so I wanted to try something I actually thought I could do to help me quit. So about two weeks before I was going to quit, I began to walk first thing in the morning. I don't normally smoke right **before or after exercising**, so that helped me delay my first smoke of the day.

**Did you try anything else as your quit day approached?**
Yes. I usually smoked about a **pack and a half a day**, but started cutting a few out each day just to see how I'd do. I'd make a game out of it by trying to drive to work without a cigarette. Then, if I really needed it, I'd have one on the way from the parking lot to the office. I also cut back on going to the bar and parties where I knew there would be a lot of smoking. And I began to skip my "dessert" cigarette before bed.

**Did these things help?**
Definitely. By the time I quit, I was walking four mornings a week and beginning to feel better already.

**Did you ask for help?**
I told my cousin Jason that I was going to need some help if I say I'm going to do something, he doesn't cut me much slack until I do it, which is exactly what I needed. We spent a lot of time at the movies, sitting in non-smoking sections of restaurants, and hanging out in other places that wouldn't tempt me. Of course, all really needed to do was taking one **good look at my kids** to make me feel good about my decision.
Image Tailoring Matters

Tailored Pictures

Matched

Mismatched

Sunset

Adapted from
http://chcr.umich.edu/mts/presentations/monday/VictorStrecher220080804.pdf
Eye Tracking
I had a lot of reasons why I wanted to quit. First, I wanted to save some money to put towards a new car. Second, my family was really sick by how my cigarettes made everything smell so bad. Plus, honestly, I was tired of having to go outside to smoke at all the places that don’t allow smoking inside. It made me feel like an outcast.

I knew I needed to do things to get ready for my quit day. So about two weeks before I was going to quit, I told my friend Chris I was going to have to take a break from our Thursday lunch out. The place we went was a smoking haven. Chris was great about it though and said I could pick a new non-smoking place to go instead.

After that, I did everything I could to stay away from coffee. Talk about temptations! I bought myself the freshest, tastiest orange juice to start my day. I still needed my pick-me-up though, so I drank those new fancy cold caffeine drinks since they didn’t make me want to light up.

I told my cousin that I was going to need some help. If I say I’m going to do something, she doesn’t cut me much slack, which is exactly what I needed.

After way more attempts than I’d like to admit, I can proudly say that I didn’t give up and have been smoke-free for over two years and counting. You know, I’m still amazed at how much better I feel about myself. And the new car I eventually got sure is nice too.
There were tons of reasons why I didn't want to smoke anymore. I was getting a little worried about this cough I got that wouldn't go away. Plus, cigarettes were costing me a fortune. But the biggest reason was that I was simply tired of cigarettes ruling my day. I like to be in control, and it was pretty clear that I wasn't.

I read somewhere that it was good to make some changes before actually quitting — to shake up my normal routines. So I gave it a try and shifted my workouts to first thing in the morning. I don't normally smoke right before or after exercising. It totally helped me delay my first smoke of the day.

Once I did that, it was all about keeping busy and keeping something on me at all times to stop using. Gum, lollipops, and coffee stirrers were my best friends, especially when I was driving. My glove box is still full of things I like that will keep me busy, especially when I'm stuck in traffic jams.

I got lots of help from my family. I had no idea how much they wanted me to quit until I saw all the emails they sent me every day to encourage me.

It took a few tries and some help from those nicotine patches before I finally quit for good. I haven't smoked in a little over a year. I still sometimes get a craving, but I know how to talk myself out of it. The best thing of all though — that nasty cough went away.
The old quitting standbys like health and money didn't really matter to me. What mattered was that every time I met someone I was interested in dating, I found out they didn't smoke and wouldn't date a smoker. Sure, I could have looked for a smoker to date, but I think deep down I wanted to quit and this seemed as good a reason as any to try.

Before I quit I tried different things to cut back on how much I was smoking. I really liked to smoke while on the phone, so that seemed like a good place to try to cut back. I made a game out of it. I could only smoke after I hung up from a call, and I could only smoke half a cigarette. I did it. It made me see that I could talk without smoking.

After I quit though, I put most of my energy into how to deal with stress without lighting up. It was hard. I had no idea how much I depended on smoking when I was stressed. But with some deep breathing exercises and talking to my friends when I was feeling overwhelmed, I slowly learned to adapt.

When it came to support, I didn't mess around. I joined online support groups, used our company's free phone-counselor program, and asked all my friends to keep an eye on me.

I've been quit for about 4 months now. Some days are easy, some day not so much. But hey, I got myself into that mess, so I'm going to be the one to keep myself out of it. And in case you were wondering, my dating life has improved dramatically. That alone is worth it!
Output Formats

- Paper-based
- Web pages
- Text message
- Email
- Testimonials
- Interactive Tools
- Audio? Video?
Examples of Tailored Message Interventions
2 Vaccine-Related Interventions

1. Vax Facts HPV
2. Vax Facts MMR
Vax Facts HPV Study

**Intervention** → 2-page tailored brochure

- **RCT**
- **Control**
Study Sample

- Mothers of adolescent girls ages 11-17
- Had “concerns” about getting daughter vaccinated against HPV
- Daughter had not received any HPV doses
- Sample recruited from primary care peds clinics
Outcome

- Change in vaccination intention from before to after reading the educational materials

- NOT designed to measure vaccine uptake
Baseline Survey

- 21 items covering barriers to HPV vaccination
- Demographics
  - Age
  - Marital status
  - Race
  - Ages/genders of children
- Past history
  - Vaccine refusal
  - Abnormal Pap smear
  - Genital warts
  - Cervical cancer
Tailoring Variables

- Barriers → top 3 → message library
- Race (pictorial)
- Past vaccination behavior
- Past HPV history
- Daughter’s name
- Number of children
Common Concerns About HPV Vaccines

Making decisions about new vaccines like the HPV vaccine can be difficult.

Like any mother, you want to do what is best for your daughter. Based on your responses, it sounds like you have many concerns about the HPV vaccine and are not planning to have your daughter vaccinated against HPV in the future.

This brochure has information that might help you decide whether the HPV vaccine is right for Olivia.

Too Young for the Vaccine?

You told us you think Olivia is too young to receive the HPV vaccine since it prevents a sexually transmitted infection.

Did you know that 20-40% of girls around Olivia's age have had sex? This can happen either by consent and also, sadly, because of rape or abuse.

The risk of HPV infection is high, even with just one partner. For example, after becoming sexually active, the chances of a girl being infected with HPV are:

- More than 1 out of 5 girls infected within 6 months.
- More than 1 out of 3 girls infected within a year.

The best time to protect Olivia against HPV is before she has sex. That is why it is recommended for all 11-12-year-old girls and older females who have not already been vaccinated against HPV. Even girls who are sexually active can still reduce their chances of cervical cancer with the HPV vaccine.

How Effective is the HPV Vaccine?

You told us you don't think HPV vaccines are very effective at preventing cervical cancer and genital warts.

There has been a lot of confusing information in the media about how well the HPV vaccine works. Here's what we know from scientific studies:

- The HPV vaccine offered at the University of Michigan protects against 4 strains of HPV.
- These strains cause most cases of cervical cancer and genital warts.
- The vaccine is more than 90% effective in preventing cervical pre-cancers and genital warts caused by these 4 strains of HPV.
- This vaccine works better than most childhood vaccines.

The HPV vaccine doesn't protect against all strains of HPV. Remember that the vaccine cannot prevent ALL cases of cervical cancer. However, getting Olivia vaccinated will reduce her risk of cervical cancer by 70%.
Results

- Significantly more + change in vaccination intention among intervention group.
- Only intervention group attitudes shifted towards being positive.
Is the MMR vaccine safe?

Like lots of moms, you've probably heard things from friends, family, or the news that make you concerned about the safety of the MMR vaccine.

From your answers, it sounds like you might be worried that:

- the vaccine isn't safe.
- there are more risks than benefits to vaccinating against MMR.
- giving Jane the vaccine could cause her to develop autism and other health problems.
- the vaccine has a lot of side effects.
- the vaccine hasn't been around long enough to know for sure that it is safe and beneficial.
- kids already get too many vaccines and maybe this is too much for their immune systems.

Choosing to get Jane vaccinated can be scary. However, a lot of scientific studies have been performed that look at the safety and effectiveness of the MMR vaccine. Click on each concern listed above to learn more about the research that has been done related to these topics.
Vaccine Related Interventions

- Pilot studies designed to examine impact on vaccination intention

- Both studies showed tailored > untailored materials for improving vaccination intention

- Ongoing studies to look at impact on vaccine utilization
Other Examples

**HOW WAYNE FOUND SUPPORT**

Daloris and I hosted the most incredible dinner party. There must have been over 20 people at the place that night. Everyone we spend a lot of time with was in our home. There was enough food to feed an army. The place smelled delicious. Friends were spread out everywhere. A few were in the living room talking and laughing, some in the kitchen enjoying the snacks, while others were walking up and down the hallway by the bedrooms checking out the wall of framed photos. The house had never felt so homey and full of life.

As soon as I felt like everyone was there, including my pal Rob, I took a deep breath and asked everyone to join me in the living room for an important announcement. As I stood there looking at everyone, I knew I had made the right decision to do this. With a big smile on my face, I told my friends that I had quit smoking and that this party was in celebration of my decision. I then told them that the reason they were all there was because I couldn't think of a better group of people who would help me through this process. I stopped talking. The room
Try Digital Health Coaching.

Personal, confidential, convenient, and non-judgmental, Digital Health Coaching constructs automated counseling sessions, on a variety of important health topics, around your personal issues and needs. We learn about you, craft a comprehensive plan to fit your unique situation, and follow up over time to keep you on track.
Dissemination and Implementation Issues
Ongoing Questions Affecting D&I

- How much tailoring is “enough”?  
  - More tailoring = more $  

- Reach vs. depth  

- Effectiveness vs. Usefulness
Adjusted 6-month smoking cessation rates* by cumulated number of high-depth intervention components received. Per Protocol analysis. (n=944; OR=1.91; CI=1.18-3.11)
How Much is Enough?

Effort vs. Effectiveness

Effort

Effectiveness
Reach Vs. Depth

vs.

[Image of a vertical stand with an iPad on top]

[Image of a desktop computer with a monitor, keyboard, and mouse]
## Reach Vs. Depth

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<th>vs.</th>
<th>Home Computer</th>
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<td>Home-based website</td>
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<tr>
<td>kiosk and roving iPad</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>No incentive</td>
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</table>

Incentives

- **Kiosk**
  - Waiting room
  - kiosk and roving iPad

- **Home Computer**
  - Home-based website

- **Incentives**
  - No incentive
Dashboard Use

Login by Date

![Login by Date Chart]
## Dashboard Use

### Enrollment

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<th>Email Count, %</th>
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<td>0 0%</td>
<td>19 44%</td>
</tr>
<tr>
<td>Any eligible child in family</td>
<td>0 0%</td>
<td>0 0%</td>
<td>12 27%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Child Enrollment</th>
<th>Postcard Count, %</th>
<th>Email Count, %</th>
<th>Other Count, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total eligible count</td>
<td>0 0%</td>
<td>0 0%</td>
<td>17 100%</td>
</tr>
<tr>
<td>Baseline started</td>
<td>0 0%</td>
<td>0 0%</td>
<td>13 76%</td>
</tr>
<tr>
<td>Baseline completed</td>
<td>0 0%</td>
<td>0 0%</td>
<td>11 64%</td>
</tr>
</tbody>
</table>

### Child Characteristics of Study Population

<table>
<thead>
<tr>
<th>Characteristics of Eligible Dyad</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 11</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>11</td>
<td>3</td>
<td>17%</td>
</tr>
<tr>
<td>12</td>
<td>3</td>
<td>17%</td>
</tr>
<tr>
<td>13</td>
<td>4</td>
<td>23%</td>
</tr>
<tr>
<td>14</td>
<td>2</td>
<td>11%</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>16</td>
<td>3</td>
<td>17%</td>
</tr>
<tr>
<td>17</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>Over 17</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Child Gender</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>7</td>
<td>63%</td>
</tr>
<tr>
<td>Female</td>
<td>4</td>
<td>36%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clinic</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BronsonOshtemo</td>
<td>3</td>
<td>25%</td>
</tr>
<tr>
<td>BronsonPortage</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>
Which is better?
Effectiveness vs. Usefulness

Do web-based tailored message interventions have to be proven effective in order to be useful (and potentially beneficial?)
Summary

- A large body of literature supports the effectiveness of tailored messaging as a mechanism to improve compliance with recommended health behaviors.

- Several variables can impact the effect of the tailored materials.
Summary

- Tailored messaging interventions can be done by anyone using free software. Outputs can take many formats.

- There are still unanswered questions about how to optimize tailored information.
THANKS!

manda.dempsey@ucdenver.edu

“Mr. Osborne, may I be excused? My brain is full.”