Tailored interventions for multiple risk behaviors

Victor Strecher, Catharine Wang, Holly Derry, Kevin Wildenhaus¹ and Christine Johnson²

Abstract

The prevention and management of chronic disease necessitates the effective treatment of health risk behaviors. Evaluating methods for maximizing change among individuals with a combination of these behaviors is an area of continued research. The University of Michigan’s Health Media Research Laboratory, in collaboration with the Henry Ford Health System (HFHS), is testing a computer-based tailored print material intervention and complementary telecounseling intervention among individuals served by the HFHS. Both interventions are informed by theoretical constructs, particularly those derived from the Trans-theoretical Framework and the Health Belief Model. Through a randomized, 2×2 factorial trial, we intend to determine effectiveness of the two interventions in achieving behavior change of three health risk behaviors: cigarette smoking, low vegetable consumption and sedentary behavior. Participants with at least two of these behavioral risk factors will receive four treatments over an 18-week intervention period. Follow-up at 3 and 12 months will assess both short- and long-term behavioral effects of the individual and combined treatments against a group receiving generic print materials. Through this research, we intend to develop a better understanding of how the presence of multiple risk behaviors affects the probability of behavior change and to evaluate the joint action of these behaviors.

Introduction

Interventions to change most health risk behaviors (e.g. cigarette smoking, nutrition and exercise) have typically focused on a single behavior. Addressing multiple risk behaviors has tremendous public health significance while posing significant intellectual challenges. Changing more than one habit may be extraordinarily difficult to do. Individuals who drink excessively, for example, appear to have a greater difficulty in quitting smoking (Breslau et al., 1996). Moreover, individuals with multiple risks, particularly the ones addressed in this research, may have factors underlying these behaviors (e.g. depression) that inhibit success in changing any health risk behavior. Individuals with multiple risk behaviors may be confused about the relative importance of each risk behavior, or may feel overwhelmed by the sheer number of ‘bad things’ they need to improve. Mason et al. (Mason et al., 1986) state that

...the very multiplicity of threats and the urgency with which they are presented make it difficult for most of us to sort out major from minor, proven from suspected, and most importantly, those that we as individuals can control from those we cannot.

Since many individuals have multiple health risk behaviors, methods for addressing multiple behaviors should be further developed and tested.

From a behavioral perspective, habit breaking
might best be accomplished when focusing on one behavior at a time. Ornstein et al. examined adherence to preventive service reminders for cholesterol screening and found that some recipients felt ‘overwhelmed’ when receiving multiple messages (Ornstein et al., 1993). Meichenbaum and Turk (Meichenbaum and Turk, 1987) state that... informational and behavioral overloads are substantially greater when multiple different adherent behaviors are required.

Similarly, Marlatt suggests that ‘one problem to avoid at all costs’ is recommending too much behavior change too quickly (Marlatt, 1985). These assertions imply the need for a sequenced behavior change process that first identifies and prioritizes risk-related behaviors to change, then sequentially intervenes on the prioritized behaviors.

**Step 1: Identifying and prioritizing multiple health-related behaviors**

An established method of identifying and prioritizing multiple health-related risk factors has been through Health Risk Appraisal (HRA) (Beery et al., 1986; Strecher and Kreuter, 1995). HRA collects epidemiological data regarding multiple risk behaviors, calculates risk based on population mortality data, and provides feedback to the users identifying their risk factors and the health benefit (usually in years of prolonged life expectancy) they can expect by modifying each risk behavior. The criteria used for prioritizing risk-related behaviors are based purely on these epidemiological estimates of life expectancy. In the case of an individual who has an alcohol problem and smokes cigarettes, a standard HRA would state that smoking, on average, contributes to a far greater loss in life expectancy than his or her alcohol problem.

The epidemiological risk calculations are uninformed by scientific considerations of the behavior change process. As Beery et al. note (Beery et al., 1986):

> Unlike many behavioral and educational interventions, HRA has not developed out of any particular educational or psychological tradition; it therefore lacks the presumption of efficacy that a close connection with a body of theory and associated empirical evidence would bring.

With HRA, little consideration is given to the many psychosocial factors that influence individual behavior change. This limitation of HRA led Becker and Janz (Becker and Janz, 1987) to conclude that...the provision of typical HRA feedback should not (on a theoretical basis) be expected to accomplish much beyond information transmission, belief or attitude change, and the induction of some level of motivation.

An alternative to using epidemiological criteria for prioritization, and the method we are using in our intervention to address multiple risk behaviors, is to ask the user what he or she is most interested in changing. The presumption is that high intrinsic motivation to change even a relatively benign behavior would be more likely to be successful, thus generating self-efficacy, motivation and commitment to change more important behaviors in the future. Motivation to change may be the result of health- or non-health-related factors. The distinction between this approach and a purely epidemiological approach is that the factors considered to be important are derived from the individual, not from the health establishment. Intrinsic motivation is viewed in many conceptual models of behavior change as an important first step of behavior change (Bandura, 1978; Curry et al., 1995; Rollnick, 1998).

**Step 2: Changing the prioritized risk behaviors**

To have high impact on a population’s health behaviors, a behavioral intervention should: (1) be able to reach large numbers of individuals and (2) be effective in changing the targeted behavior. Together, the number of people reached multiplied by the efficacy rate provides a measure of program impact (Velicer and Prochaska, 1999). In many settings, such as managed care and large employers,
Tailored interventions for multiple risk behaviors

we see two strong candidate interventions for achieving high impact: tailored materials and telephone counseling.

Over the past 10 years, tailored print interventions for a variety of health risk behaviors have been developed and evaluated in diverse settings. While there are important exceptions, administration of self-help materials tailored to the specific needs and interests of the user has usually resulted in greater behavior change outcomes than standard, untailored materials. Positive effects of tailored materials have been demonstrated in a wide variety of behavioral areas, including smoking cessation [e.g. (Strecher, 1999; Velicer and Prochaska, 1999; Lancaster et al., 2000)], dietary fat reduction [e.g. (Brug et al., 1999; Krystal et al., 2000)] and physical activity [e.g. (Marcus et al., 1998; Bock et al., 2001)]. Tailored materials require: (1) knowledge of characteristics, at an individual level, relevant to the targeted behavior change (or movement through stages of change), (2) an algorithm that uses these data to generate messages tailored to the specific behavior change needs of the user and (3) a feedback protocol that combines these messages in a clear, vivid manner. Tailored print-and web-based materials are increasingly less expensive to develop or license for larger-scale, real-world applications (Eng, 2001).

Telephone counseling interventions have also been shown to have a positive influence on smoking cessation [e.g. (Lichtenstein et al., 1996)], dietary change [e.g. (Delichatsios et al., 2001)] and physical activity [e.g. (Dunn et al., 1998)] behaviors. Telephone-based programs generally utilize a counselor trained to deliver advice and information in a format designed to enhance self-efficacy, behavioral skills, motivation, commitment and knowledge. Telephone counseling is usually delivered periodically, over the initial 3–6 months of the behavior change process. In a study of low-intensity telephone counseling for smoking cessation, Lando et al. found substantially higher quit rates at 6-month follow-up between intervention and control group participants (Lando et al., 1996). Although these results had faded by the 18-month follow-up, Lando et al. argue that if the telephone support strategies could be provided over a more extended period of time, these strategies might be useful for other ‘life-style-related public health problems’ as well.

We believe that both tailored print material and tailored telecounseling interventions offer potentially cost-effective, generalizable approaches to addressing multiple risk behaviors. While neither is a panacea, both approaches have the potential to reach large numbers of individuals in need with a degree of individualization that far exceeds the impact of typical mass media interventions.

Multiple risk factor intervention study

We have developed two interventions, to be tested both individually and in combination, designed to achieve sequential change of multiple risk behaviors: a computer-based longitudinally tailored print material intervention and a complementary computer-based longitudinally tailored telecounseling intervention. Both tailored print material and tailored telecounseling interventions offer potentially cost-effective, generalizable approaches to addressing multiple risk behaviors.

Study design

The two interventions are being tested among individuals served by the Henry Ford Health System (HFHS). This location is ideal for our study because of (1) the high prevalence of health risk behaviors in this population and (2) the diverse racial/ethnic composition of the population. Prior to the beginning of the study, we estimated that over 25% would be African-American. Of the 255 people enrolled at the time of writing, 113 (44%) were African-American.

Individuals age 21–70 who engage in two or more targeted risk behaviors—any combination of cigarette smoking, low vegetable consumption or sedentary behavior—are eligible for the study, regardless of their readiness to changing any of the three behaviors. Through a randomized, 2×2 factorial trial, we are determining the effectiveness of the two interventions in achieving behavior change in the three targeted behaviors. Participants
are randomized to receive either generic print messages, tailored print messages, tailored telecounseling sessions or tailored print messages plus tailored telecounseling sessions. Following initial data collection and random assignment, study participants receive four treatments of their assigned intervention over an 18-week period: 2 and 4 weeks after baseline, and at 2 and 4 weeks after the 3-month assessment. Two data collection follow-up periods, at 3 and 12 months, allow us to assess short- and long-term effects of the individual and combined treatments.

Data collection to identify subjects with multiple risk factors

Data collection from subjects is organized to minimize the number of questions subjects answer. All subjects first answer questions in an initial ‘gateway section’ which assess current level of vegetable consumption, current smoking status and current level of physical activity. If subjects engage in two or more of these risky behaviors (smoke five or more cigarettes a day, eat less than three servings of vegetables a day or exercise less than four times a week), they are eligible to be in the study. If eligible, participants are asked more specific behavioral questions about only the risky behaviors they engage in (‘behavioral history section’). Next, participants are asked to select one of their eligible behaviors for which they would like more information to help them make changes. The final ‘psychosocial history section’ asks more specific psychosocial questions regarding that behavior. Psychosocial items include readiness to change, benefits, barriers, motivation, self-efficacy and social support.

Participants’ first two interventions focus on the initial behavior selected; they can then choose the same behavior to work on or a new behavior during the 3-month assessment. For those in the tailored conditions, data from both baseline and subsequent 3-month assessment will be used to construct the tailored print materials and telecounseling sessions. As previously stated, we are using a sequential procedure for addressing multiple risk behaviors that begins with prioritization of relevant behaviors according to the user’s selection of behaviors to work on, then sequentially move through subsequent, participant-selected, behaviors. It should be noted that the participant might not be interested in changing any behavior. In this case, the participant is still asked to select a behavior.

Theoretical approach to tailored print and telecounseling interventions

The primary models guiding each of the tailored interventions are the Transtheoretical Model (TTM) (Prochaska et al., 1993, 1992 1983) and the Health Belief Model (HBM) (Rosenstock et al., 1988). The stage of change construct of the TTM is used to define the subsequent HBM constructs considered for tailoring. Relevant HBM constructs include a participant’s perceived benefits of the behavior change, perceived barriers to changing, confidence in their ability to change (similar to barriers) and cues to action. Depending on a person’s stage of change, particular HBM constructs will likely vary in their potency to initiate and sustain behavioral change. For example, Prochaska et al. have found an increase in pros (benefits) of changing as people move from precontemplation to contemplation and a decrease in cons (barriers) of changing as people move from contemplation to action (Prochaska et al., 1992). Figure 1 describes the anticipated effects of the intervention from baseline to 12-month assessment.

In the conceptual framework described in Figure 1, primary intervention effects are determined through pathways a–d. Initially, the intervention uses baseline data to tailor messages to the specific stage of change, benefits, barriers, cues and self-efficacy of the participant (path a), with the intent of changing these psychosocial factors. We believe that these HBM components map to the TTM stages of change in the following ways.

● Precontemplation. Among participants uninterested in changing the selected behavior, we focus tailored messages to the benefits of changing. Current intervention research suggests that gain-framed messages (e.g. the benefits of behavior change) have a stronger impact on cigarette smoking and other preventive behaviors than
Tailored interventions for multiple risk behaviors

<table>
<thead>
<tr>
<th>Baseline Assessment</th>
<th>3-Mo. Assessment</th>
<th>12-Mo. Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Behaviors</strong></td>
<td><strong>Intervention (2 &amp; 4 weeks post-assessment):</strong></td>
<td><strong>Intervention (2 &amp; 4 weeks post-assessment):</strong></td>
</tr>
<tr>
<td><strong>Behavioral choice</strong></td>
<td><strong>Precontemplation</strong></td>
<td><strong>Precontemplation</strong></td>
</tr>
<tr>
<td><strong>Psychosocial</strong></td>
<td>Benefits</td>
<td>Benefits</td>
</tr>
<tr>
<td></td>
<td>Cues-to-action</td>
<td>Cues-to-action</td>
</tr>
<tr>
<td></td>
<td>Contemplation</td>
<td>Contemplation</td>
</tr>
<tr>
<td></td>
<td>Benefits</td>
<td>Benefits</td>
</tr>
<tr>
<td></td>
<td>Barriers</td>
<td>Barriers</td>
</tr>
<tr>
<td></td>
<td>Self-efficacy</td>
<td>Self-efficacy</td>
</tr>
<tr>
<td></td>
<td>Cues-to-action</td>
<td>Cues-to-action</td>
</tr>
<tr>
<td></td>
<td>Preparation</td>
<td>Preparation</td>
</tr>
<tr>
<td></td>
<td>Benefits</td>
<td>Benefits</td>
</tr>
<tr>
<td></td>
<td>Barriers</td>
<td>Barriers</td>
</tr>
<tr>
<td></td>
<td>Self-efficacy</td>
<td>Self-efficacy</td>
</tr>
<tr>
<td></td>
<td>Cues-to-action</td>
<td>Cues-to-action</td>
</tr>
<tr>
<td></td>
<td>Action</td>
<td>Action</td>
</tr>
<tr>
<td></td>
<td>Benefits</td>
<td>Benefits</td>
</tr>
<tr>
<td></td>
<td>Cues-to-action</td>
<td>Cues-to-action</td>
</tr>
</tbody>
</table>

**Fig. 1.** Intervention effects framework.

loss-framed messages (e.g. the risks of not changing) (Rothman and Salovey, 1997; Wilson et al., 1988; Detweiler et al., 1999; Schneider et al., 2002). Following the suggestions of Weinstein, our messages focus most attention on the short-term over the long-term benefits of the behavior change (Weinstein, 1988). As a cue-to-action (though, among precontemplators, this concept should really be termed a 'cue-to-contemplation'), we provide a worksheet to identify and further consider the benefits of changing, along with a monitoring plan designed to promote consideration of the health risks of continued inaction and the benefits of change. We specifically ask the participant to record any warning signs that might mean it is time to change.

- **Contemplation.** Among participants interested in changing the selected behavior within the next 6 months, we focus tailored messages to both the benefits and the barriers to changing. This may be thought of as a simultaneous ‘push’ in the subject’s motivation and a ‘pull’ through their perceived barriers. As a ‘cue-to-preparation’ for contemplators, we include a worksheet to identify benefits of changing, a monitoring plan designed to promote consideration of barriers, a section for identifying solutions to address barriers, and a suggestion to ‘experiment with change’ (e.g. not smoking a favorite cigarette; trying one addition vegetable). We acknowledge that the participant is not ready to make a complete change, but encourage small behavioral experiments as a method of building self-efficacy (Bandura, 1994).

- **Preparation.** Among participants interested in changing the selected behavior within the next 30 days, we focus most of the tailored messages on perceived barriers and self-efficacy. We also identify and differentially address varying levels of motivation. A focus directed only at skills development may miss subjects in preparation who lack strong motivation to change (Rollnick, 1998). On the other hand, individuals who have high motivation but low self-efficacy may have a particularly difficult time changing and have strong negative emotions if they fail to change (Seligman, 1975; Strecher et al., 1986). As a cue-to-action for preparers, we include a monitoring plan designed to consider barriers
and their solutions, a section designed to promote a specific change date (e.g. a quit date for smokers), and a non-contingency contract (Janz and Becker, 1984).

- **Action.** Among participants who have, at the 3-month assessment, succeeded in changing their initially targeted behavior, some will chose to work on a new behavior, while others will chose to continue working on their initially selected behavior. Those who continue working on their initially selected behavior will be in an action stage of change. In this group, we focus on recapitulating the benefits of changing, and in creating new cues-to-action in the form of goals and dates to set related to behavioral maintenance or additional change. For example, individuals who have started to increase their vegetable consumption will be encouraged to set a date for additional goals, such as trying a new vegetable.

Changes in these psychosocial characteristics are thought to then influence behavior and stage change (path b). Behavioral changes and choice to either continue working on the behavior selected at baseline or to work on a new behavior are assessed and, along with a new psychosocial assessment, used to generate a new pair of tailored materials (path c), with a resulting change in psychosocial factors and behavior change (path d). In addition to the primary pathway of intervention effects (paths a–d), we anticipate effects on 3- and 12-month behavioral outcomes to be influenced by previous behavior and psychosocial characteristics (paths e, f and g).

**Integrating the tailored print and telecounseling interventions**

To deliver the tailored telecounseling sessions, our trained telecounselors use prompts on a computer screen that are tailored as described above. While the prompts are briefer than messages in the tailored booklets and telecounselors may phrase messages slightly differently each time, all telecounselors discuss the same sets of topics with participants, based on the participant’s stage of change. Those receiving both the tailored materials and the telecounseling sessions also discuss their booklet contents with the telecounselors. Participants are asked to retrieve their booklets at the beginning of the call so that they may complete the activities in the booklets with the telecounselor, who can themselves view a copy of participant’s tailored booklet using our the web-based telecounseling program. The study management system, which tracks when participants need to be called, also attempts to ensure continuity of treatment by matching the same telecounselor–participant pairs at each treatment session.

We anticipate that the combination of tailored print materials and tailored telecounseling will be more effective in producing risk behavior change than either of the interventions alone and that each intervention alone will be superior to untailored print materials.

**Summary**

Several aspects of the present study make it unique from research that has been previously conducted using tailored communications to target health risk behaviors. Primarily, our approach is unique in that we are testing the impact of two tailored interventions channels, alone and in combination, on multiple risk behaviors. Moreover, following assessment of participants’ baseline characteristics of interest, including their stage of change, they are given the choice of a risk behavior on which to focus. In addition to acknowledging and complying with the interests of the participant, we hope that initial success will increase their self-efficacy and motivation to make changes in a second behavior.

Our study created a tailoring system that uses data collected at two points in time: baseline and 3 months post-baseline. Initial baseline data is used to generate the first two interventions. Three-month data is combined with initial baseline data to generate the third and fourth tailored interventions. Using data collected from both baseline and follow-up allows us to set initial goals and to provide feedback on progress based on 3-month data. We refer to this process of using data collected over multiple points in time as ‘longitudinal’ tailoring;
Tailored interventions for multiple risk behaviors

others [e.g., (Velicer et al., 1993)] refer to this process as ‘ipitative’ tailoring.

Results of this research should inform a next generation of behavioral programs in significant ways. Employers, insurers, voluntary health organizations, governments and other institutions are looking for health promotion, disease prevention and disease management programs that reach large populations, examine a broad spectrum of health needs and effect long-term behavior change. In addition to these challenging requirements, the cost of these programs is also an important consideration. The behavioral programs we are testing in this research are possible prototypes for real-world products and services in the public health marketplace. With the vast proliferation of untested, unproven ‘wellness’ products, our society runs significant risk of trivializing a critically important endeavor. The vast research–practice gap in this field can only be closed with a stronger base of scientific knowledge.

Note

V. S. is Chairman and shareholder in HealthMedia, Inc., Ann Arbor, MI.

References


V. Strecher et al.


Received on February 14, 2001; accepted on November 13, 2001