

Tailored Interventions in Public Health

Where Does Tailoring Fit in Interventions to Reduce Health Disparities?

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The authors present a program of research that focuses on reducing health disparities among African American populations through innovative health communication and health promotion interventions. Research on tailored communications ranges from investigating efficacy, manipulating communication variables, and comparing tailored print versus other state-of-the-art intervention modalities to integrating tailored materials into public health interventions based on a socioecological model. Examples from other research, as well as advantages and disadvantages of these approaches, are discussed. The purpose of the overall research program is to develop effective and cost-effective health communications for promoting health behavior change that also are culturally relevant and potentially sustainable in communities.

Keywords: *tailoring; community interventions; health communication; health disparities; minority health*

Understanding optimal ways of both communicating with and educating the public regarding voluntary actions that reduce risk of ill health and enhance well-being is the fundamental aim of health communication research. In developing and testing a number of tailored and targeted health communication interventions, our research program has largely been applied to reducing health disparities among minority and underserved communities.

This research focus evolved from not only concern about documented health disparities and the relative lack of preventive health communication aimed at these populations but also promising studies from other research groups and a theoretical base. In one early study, Skinner, Strecher, and Hospers (1994) evaluated the impact of distributing a single printed tailored message to women encouraging yearly mammograms and found that the intervention had greater impact among lower income and minority women compared to women in the sample who were higher income and White. Given concerns about reading literacy and health care access in lower income and minority populations in general, these findings were somewhat unexpected. The study findings,

however, suggest that perhaps individuals with lower literacy and less access to other health information might particularly benefit from tailored communications, perhaps precisely because the process of tailoring prunes out the irrelevant information and highlights only what each individual would find most salient for his or her behavior change. The resultant communication, therefore, may actually reduce the burden of reading and processing information compared to receiving a generic health communication that must “cover the waterfront” for all potential readers. Indeed, many of our study participants have commented that they liked the tailored newsletters because they were easy to read and, thus, held their interest.

Our program of research, in large part, has focused on studying the adaptation and utility of individually tailored communications among minority and underserved populations. As explained in this article, our research has evolved with time in three general phases: from initial studies examining the impact of tailoring versus not tailoring on individual dietary change, to studies blending tailoring with other interventions in multicomponent and multilevel strategies in group settings such as Black churches and blue-collar workplaces, and more recently, to testing tailoring head-to-head against other culturally appropriate interventions to determine the most powerful and efficient interventions to address health disparity issues. Within these phases, we have also studied more specific attributes of tailored communications, such as the choice of message source in messages specifically designed for African American audiences. Each phase has contributed to some answers but many more questions remain regarding the role of tailoring in health disparities reduction programs.

Essentials of Tailoring

Message tailoring is the process of developing a specific, behavior-focused communication based on an assessment of individual characteristics (Kreuter, Strecher, & Glassman, 1999). Individual message tailoring characteristics can include personalization such as participant name and information related to other personal characteristics (e.g., child name, church or workplace name). Tailoring also includes individualizing health communication content based on participant demographics such as gender and race/ethnicity, psychosocial variables such as perceived barriers and benefits to changing versus maintaining usual behavior, and behavioral feedback and comparison information such as regularity of cancer screenings in comparison to expert guidelines. The theoretical basis of tailored communications derives from social-psychological as well as communication and persuasion theories and models. Variables chosen for use in individual tailoring content are usually built on social-psychological theories that predict behavior change based on a set of theoretical constructs. For example, tailored feedback may be based on a model such as the health belief model, which predicts that individuals are more likely to take action in the face of a health threat when they believe that they are at risk and when the perceived benefits of engaging in a health behavior outweigh the perceived costs or barriers (Janz & Becker, 1984). Many tailored interventions use the stages-of-change transtheoretical

model of Prochaska and DiClemente (1992) to determine relative readiness to change and provide stage-matched feedback to the participant. In our earliest tailoring study, we provided simple tailored letters along with individual dietary and psychosocial feedback primarily based on the health belief model and stages-of-change transtheoretical model to primarily White, middle-class, family practice patients in central North Carolina. In a randomized trial, we found that one mailing of the tailored materials produced significant dietary fat reduction after 4 months versus no change in the generic feedback or control groups (Campbell et al., 1994). In this study, the only targeting to context was the use of the family doctor's name and office name to enhance credibility of the feedback.

The Role of Group Targeting and Contextualization

The content and layout of tailored information, as well as hypotheses about why tailoring works, may be founded on theories of communication and persuasion such as the McGuire matrix and the elaboration likelihood model (McGuire, 1989; Petty & Priester, 1994). These models describe steps in persuasion starting with message attention and going on to message processing, "yielding" to the arguments, attitude change, and finally behavior change. A number of studies show that tailored communications seem to induce more attention and yielding, in that people are more likely to recall and read more of tailored versus nontailored information and to report greater personal relevance of tailored materials (Brug, Oenema, & Campbell, 2003; Petty & Priester, 1994). In addition, the elaboration likelihood model suggests that factors such as issue involvement and personal relevance (e.g., how much one cares about the issue of cancer and sees the feedback as personally important) lead to more central processing and cognitive elaboration of the message content. Low involvement, however, leads to use of more peripheral cues such as the colors, graphics, attractiveness, or celebrity of the message source. In more recent tailoring studies, we have tried to use methods of targeting as well as tailoring the communication to raise both personal relevance and to capitalize on peripheral cues in our choices of format, layout, and source as described below.

The tailoring process can be described by the following example. If a tailored message were to be developed for an adult male to encourage weight loss, an interview or survey would be important to query him about the relevant determinants of his current lifestyle and health behaviors related to weight. The interview/survey identifies the following factors that may act as determinants: His name is Joe Smith, he is 45 years old; he identifies himself as African American; his job involves working 12-hour shifts; he eats a lot of fast food on the road and perceives convenience as a primary reason for his food choices; he has low recreational activity because of sitting on the job; and his main barriers to being more physically active are lack of time and the cost of joining a health club. A tailored message designer may incorporate this interview/survey information into a message that specifically addresses this information and

attempts to increase his motivation for change. Messages might, for example, address him by name, provide feedback on his current diet emphasizing the contribution of fast food to his high fat diet, suggest healthy fast food options, include a testimonial from a truck driver of similar demographics about how he became motivated to start exercising and eating healthier, offer tips for fitting physical activity into his schedule, and possibly provide a discount coupon and directions to the local gym.

With accompanying appealing graphics and design elements, the message may also be further targeted to the preferences of a group of people like Joe Smith. For example, focus groups with African American male truck drivers might hypothetically reveal preferences for certain colors and images, might discover that most members have strong religious beliefs, and might indicate that most truckers in this demographic listen to certain radio stations while driving. Integration of these themes and targeted elements into the tailored materials may add to the perceived relevance of the communication and encourage the individual reader to feel that it seems meant for “people like me.” In our tailored interventions, we typically combine assessment-based tailoring and group-level targeting based on extensive formative research in specific community audiences (Carbone, Campbell, & Honess-Morreale, 2002). In addition, we often include testimonials from people who can serve as credible role models, such as pastors and cancer survivors, to enhance the salience of and interest in the communication. We believe that these strategies enhance effectiveness, based on qualitative feedback from participants, although we have not formally tested the relative impact of providing tailored feedback to minority populations with and without the addition of group-level targeting.

Given the capabilities of computers and software, it is possible to create tailored message programs to maximize individuality by producing thousands to millions of combinations of tailored messages. However, it is likely that there is a point of diminishing returns after which tailoring to more and more variables adds little or no advantage. On a population-wide scale for public health impact, message tailoring is a potentially cost-effective educational approach if issues such as extensiveness of tailoring variables and assessment needed, complexity of layout/design, use of preexisting graphics/text, print quality, and/or use of Web-based systems are balanced for the budget and participants at hand (Abrams, Mills, & Bulger, 1999). However, addition of specifically group-targeted information that may increase cultural and community relevance may add additional complexity to dissemination of evidence-based tailored interventions that have been tested in one setting. For example, a testimonial from a community leader in eastern North Carolina may not seem very relevant to someone living in Los Angeles.

Tailoring: Effectiveness and Variances

To describe the effectiveness of tailoring methodology, research groups have conducted several reviews (Brug, Campbell, & van Assema, 1999; S. Miller et al., 2004;

Skinner, Campbell, Rimer, Curry, & Prochaska, 1999). The purpose of this section is to (a) briefly review published studies on individual tailoring and (b) describe examples of studies that examine tailoring variables thought to be especially relevant for African American audiences.

Composing the first category are randomized trials that compare tailored messages to either nontailored messages or no information (the so-called first generation of tailoring research). As described in a review by Skinner et al. (1999), eight randomized trials mark this time period of published research (from 1990 to 1998) that consistently shows tailored messages were better remembered, more thoroughly read, and perceived as more relevant compared to nontailored or generic messages. Furthermore, six of the eight trials document positive behavior change for diverse behaviors such as cancer screening, dietary change, and physical activity. As previously noted, an earlier study by Skinner et al. (1994) indicates greater effectiveness of tailored mammography feedback for African American versus White women. These earlier studies focus almost exclusively on print communication. With time, the use of computer technology has evolved not only to provide a means of creating tailored materials but also as an interactive platform in which participants directly input their personal data and have the ability to read the tailored information on-screen ("second generation" research). Evidence from interactive tailoring, however, seems mixed at this point in terms of whether effects are comparable to print, and few studies test this technology among minority and underserved populations (Campbell, Carbone, et al., 2004; Oenema, Tan, & Brug, 2005).

More recent, a second category of tailoring research attempts to move beyond effectiveness trials testing whether tailoring works to specifically examining one or more aspects of tailoring, such as message source or variables used to tailor individualized communications. Some of this research specifically examines aspects of tailoring that may enhance cultural relevance for African American participants. Concerning mammography use among African American women, in this issue Kreuter and Haughton (2006) described their research examining the use of tailoring to cultural variables (e.g., collective pride or activism) versus psychosocial and behavioral variables (Kreuter et al., 2005). Currently, Resnicow and colleagues are conducting research to further examine the efficacy of tailoring to heterogeneous cultural identity variables among African Americans such as degree of Afrocentrism versus acculturation/Eurocentrism (National Institutes of Health Grant No. 1P50CA101451-01).

Earlier in our research program, we conducted a substudy as part of the National Cancer Institute–funded Black Churches United for a Better Health 5-a-Day Project to understand more about the importance of one dimension of health communication, the message source, in tailoring communications for African American church populations (Campbell, Bernhardt, et al., 1999). We were concerned about the issue of source credibility based on formative research for the study that reveals substantial skepticism and distrust of research but indicates confidence in the Bible and scripture to provide health guidance. In our study, we manipulated the source in the tailored newsletters so that the newsletter was introduced and endorsed by either the participant's pastor or by nutrition experts (Campbell, Bernhardt, et al., 1999). The newsletters

using the pastor source featured on the cover a message from the pastor of the participant's church, addressing why he or she believed it was important for parishioners to eat more fruits and vegetables. In addition, each pastor provided his or her photograph and a 5-a-Day "grace" or prayer. The expert-source messages, on the other hand, provided information on the cover about why researchers believe it is important to eat 5-a-Day and (in place of the pastor photo) the National Cancer Institute 5-a-Day for Better Health logo. Both newsletters were identical in terms of the tailored feedback information and variables used for individual tailoring. Churches were then randomized to receive either the "spiritual"-oriented or the "expert"-oriented tailored newsletters.

Results show that compared to those reading expert-source newsletters, participants who read the pastor-source newsletters rated them as more trustworthy (53.6% vs. 63.5%, $p < .05$) and having a higher impact on their intention to eat more fruits and vegetables (45% vs. 58%, $p = .02$). Results from this substudy do not reveal whether differences in these communication mediators led to the observed differences in dietary behavior at 2-year follow-up because the intervention included multiple components that most likely contributed to the overall improvement in the intervention churches (Campbell et al., 2000). However, the findings suggest a need for more research studying variances in communication elements such as message source and cultural orientation to better design tailored communications to address health disparities.

Tailoring Versus Other Individualized Intervention Modalities

A third category of tailoring research involves studies that compare tailoring alone to tailoring with or without another state-of-the-art individualized intervention strategy. In particular, several studies examine tailoring versus telephone counseling among diverse populations in which comparisons of effectiveness among African Americans and Whites have been possible. Champion et al. (2002) conducted a study to increase mammography adherence, which because of the disproportionate levels of breast cancer mortality between African American and White women, has particular relevance to health disparities. In this study, 1,390 nonadherent women were recruited from two U.S. sites with considerably different group demographic profiles. Compared to the Indiana University site, the St. Louis site had a higher percentage of African Americans (83% vs. 21%), women who reported less than high school education (52% vs. 18%), and households with reported incomes less than US\$15,000 annually (77% vs. 24%). Participants were randomized to one of four groups: control (no intervention), one tailored mailing, one tailored telephone counseling call, or both of these methods.

Results indicate participants receiving both methods were 2.16 (95% confidence interval: 1.46 to 3.19) times more likely to become adherent compared to women in the control group, indicating that the combined tailored mail and telephone group was most effective. However, the mostly White women from the Indiana University site

were significantly more likely to become adherent compared to mostly African American women from St. Louis. This finding, therefore, did not replicate the more favorable effects of tailored mammography interventions among African Americans previously found by Skinner et al. (1994).

Our research also compares tailoring to telephone counseling among older African American and White participants in a National Cancer Institute–funded cancer prevention and control study. The NC STRIDES Project was a randomized trial of two interactive health communication strategies for colon cancer prevention and health promotion among older adults: mailed computer-tailored print communications (TPCs) in the form of personalized newsletters and telephone-based motivational interviewing (TMI) counseling sessions. Both the TPC and TMI interventions were primarily based on two widely used health behavior theories, the stages-of-change transtheoretical model (Prochaska & DiClemente, 1992) and social cognitive theory (Bandura, 1989). From these theories, we identified key constructs for individualization of messages and TMI calls including perceived barriers to change, stage of readiness, social support, knowledge/awareness, and demographic characteristics of participants. The TPCs provided expert-system advice, whereas the TMI calls encouraged participants to identify their own strategies for change. Both interventions aimed to enhance self-efficacy and motivation, leading to behavior change. The 2×2 research design allowed for comparison of each intervention and a combined intervention against a no-intervention control condition.

Study participants were recruited from a population-based case-control study of colon cancer risk factors in a 33-county area of central and eastern North Carolina (Satia, Campbell, Galanko, James, & Carr, 2004; Satia, Galanko, Martin, Ammerman, & Sandler, 2004; Satia, Galanko, Martin, et al., 2003; Satia, Galanko, Potter, et al., 2003). Counties were selected based on their mix of urban and rural areas as well as the proportion of the county population who were African American. The population-based randomized study design, therefore, had both good internal and external validity, which increased its generalizability in terms of broader public health impact. A limitation of the study design, however, was potential selection bias because of intervening with a cohort that had already demonstrated health motivation by participating in a previous case-control study. The population-based sample recruited for NC STRIDES included 922 individuals, of whom 89% completed the baseline survey. The sample included healthy colorectal cancer survivors generally diagnosed with early stage disease approximately 3 years prior to the study ($n = 304$) and a general population group ($n = 521$) that were very similar in terms of demographics (i.e., 48% female, 36% African American, with a mean age of 66.5 years; James et al., in press).

The TPC intervention included four personalized computer-tailored newsletters mailed to participants' homes bimonthly for the first 6 months after baseline data collection (Months 2, 4, and 6); the fourth mailing occurred 9 months postbaseline. Newsletters 1, 2, and 3 were tailored using the baseline survey data, and Newsletter 4 incorporated additional data from a 6-month update telephone call to give feedback on participant progress. Preintervention focus groups were used in combination with pertinent literature and project team expertise to develop appropriate tailoring variables,

message content, language, literacy level (approximately eighth grade), and graphic design. The TPC message library consisted of more than 400 different messages, with content, graphics, and layout targeted to an older audience. Newsletters were personalized with names of the participant and provided tailored elements including behavioral feedback regarding diet and physical activity, colorectal cancer risk factors and screening status (for non-cancer-affected participants), stages of change, social support, barriers to change, knowledge, and demographics (race and gender). Additional message elements were targeted to audience and community factors, including county-specific resources for each of the 33 counties in which participants may have resided and testimonials written by cancer survivors and people who had not had colorectal cancer but had made changes in lifestyle factors such as diet and exercise.

The TMI intervention consisted of four brief (20-minute) calls delivered during a 9-month period. Each call followed a counseling protocol based on motivational interviewing principles of communication and brief counseling and negotiation (W. Miller & Rollnick, 1991). Motivational interviewing principles include a client-centered, collaborative decision-making approach; giving nonjudgmental feedback; rolling with resistance; and encouraging the participant to make the argument for change. Motivational interviewing interventions have been effective for encouraging a variety of health behavior changes including increasing fruit and vegetable consumption (Resnicow et al., 2004). Calls were conducted by trained research team members and graduate students. Careful training on TMI principles and techniques and the protocol were conducted prior to starting the interviews. The calls were additionally “tailored” by incorporating information derived from participant baseline and update surveys regarding priorities for change, baseline behavior, and cancer status. Control group participants received four mailings of generic (nontailored) health information (e.g., on breast and prostate cancer) that was not related to the primary study outcomes.

Results show that at 1-year follow-up, the combination of TPC and TMI had produced an increase in fruit and vegetable consumption in the general population sample that was approximately double the effect ($p < .01$) compared to each separate intervention or a control group (Campbell, Carr, & Allicock-Hudson, 2005). It is interesting that African Americans made larger improvements in fruit and vegetable consumption, roughly an additional one-half serving increase, compared to White participants. In NC STRIDES, we also conducted a cost-effectiveness study that shows the combination of TPC and TMI was most cost-effective overall for increasing fruit and vegetable consumption. However, TPC alone was clearly more cost-effective than TMI because of the relatively higher cost of training and conducting telephone counseling as compared to producing and mailing tailored print materials. And it is interesting that among African Americans, the TPC-only intervention emerged as most cost-effective. This finding was unexpected and requires further exploration. It is possible that the cost of telephone counseling was higher in this population because of either more difficulty reaching participants or longer telephone interviews. However, it further suggests that perhaps tailoring of intervention strategy and delivery method to population subgroups may be a promising avenue for future tailored interventions in public health settings.

Although we observed significant effects of the intervention for increasing fruit and vegetable intake, we did not find intervention efficacy for promoting moderate to vigorous physical activity among either ethnic group. This may have been because of the age of the population (mostly older than 65) and the relatively low intensity of the home-based interventions that were tested. We are interested in finding ways to deliver more intensive and effective physical activity interventions on a population-wide scale, possibly involving more frequent tailoring and/or other interactive strategies such as personal coaching. Attention to cultural factors, however, will be important in terms of developing these approaches.

Role of Tailoring Within a Socioecological Framework

From a public health perspective, the types of more basic and relatively short-term tailored health communication studies described above are useful in terms of helping to identify effective ways to promote initiation of healthful behavior changes. These studies, however, may not move us forward in terms of creating interventions with maximal potential for impact and sustainability in communities and populations at risk, such as minority communities. Tailored communications aimed at individual behavioral and psychosocial constructs, for example, may completely overlook influences on behavior that exert their effect beyond the individual's control. For example, the effect of a wife's shopping and cooking practices and the children's food preferences on a husband's dietary fat consumption constitute interpersonal and social network influences. The high cost of purchasing fruits and vegetables, and lack of availability of healthy options at work, are organizational and environmental factors that may further influence the husband's ability to successfully implement and maintain changes.

There is a growing body of evidence that human-environment interactions are essential components of most if not all health practices, thereby positioning a socioecological approach as a potentially effective means of conceptualizing and designing health promotion interventions. To provide a framework for this process, the Institute of Medicine has recommended the use of a socioecological model that categorizes the multiple levels of influence on human-environment interactions into individual, interpersonal, institutional, community, and policy levels (Smedley & Syme, 2000). By taking into account the effect of these multiple levels, multicomponent health promotion interventions are more complex to conceptualize and implement but more likely to result in lasting behavior change. McLeroy, Bibeau, and Steckler (1988) have identified five distinct sets of factors that compose an ecological perspective on health promotion; these factors are summarized in Table 1.

From a socioecological perspective, tailored communications may fit in the context of multilevel interventions where it is hypothesized that an individual-level intervention is one essential component but will be more effective when it is also supported and enhanced by activities at more macro levels of change, such as at the social network or

Table 1**Socioecological Framework for Public Health Interventions**

Level of Change	Theoretical Approach and Target	Example of Intervention Strategy
Intrapersonal	Individual characteristics that influence health behavior, such as knowledge, attitudes, beliefs, affect, and past experiences	Individual counseling Tailored communications Motivational interviewing
Interpersonal/Social network	Interpersonal and group influences including formal and informal social network and social support from family, coworkers, friends, and so forth to support healthy behaviors	Peer education Lay health advisors Support groups
Organizational	Rules, regulations, policies, incentives, resources, and facilities that may help promote and/or maintain recommended behaviors within institutions	Worksite health promotion Church-based programs
Community	Shared identity, norms, and values of people in a given neighborhood or locality; resources, social capital, and collective action to improve health for all members	Community participation Capacity building Collective action
Environment/Policy	Neighborhood, community, or governmental resources; institutions, policies, advocacy, media activities, or other activities that improve the supportiveness and availability of healthy options for residents of that geographic area	Social marketing Mass media campaigns Point of purchase interventions Legislation

Source: Glanz & Rimer (1995).

organization level. In much of our public health research that focuses on minority and underserved populations, we have evaluated the effect of fairly large-scale multicomponent interventions to see whether we could achieve any significant dietary and/or other behavior changes in these populations at increased risk for chronic disease. Tailored communications have been included in an overall intervention framework that has attempted to intervene at multiple levels of influence. In this way, our research differs from the previous examples described in the article, in that the effects of tailoring could not be isolated and, therefore, results could not provide information that would specifically tell us whether the tailored component was responsible for the observed program effects. Examples of these studies include the Black Churches United for Better Health and Health Works for Women projects described below (Campbell, Demark-Wahnefried, et al., 1999; Campbell et al., 2002).

The Black Churches United for Better Health Project was conducted among 3,737 African American church members from 50 churches in 10 eastern North Carolina counties with high rates of cancer morbidity and mortality. The 2-year intervention demonstrated significant dietary impact (0.85 daily fruit and vegetable servings increase) from a multilevel intervention that included 11 different types of activities focused at different levels of change in the socioecological model (Campbell, Demark-Wahnefried et al., 1999). At the individual level, as previously described, tailored newsletters were provided to all intervention church members. Examples of social network activities included training of lay health advisors (LHAs) in the churches to spread health information through their existing social ties and holding various food-oriented social events at church. Organization-level interventions included pastor support and education and training of a nutrition action team to organize church-level activities that would promote eating fruits and vegetables, such as a 5-a-Day Sunday and formal educational sessions. Community-level activities included training of community coalitions in the counties and sponsoring community-wide events. And at the environment level, church victory gardens, produce discounts, and farmer's markets were established and enhanced. Such a complex intervention was difficult to mount and to adequately evaluate; however, a detailed process evaluation shows that the activities with the highest perceived impact were food events and churchwide activities, the tailored newsletters, and social support from church members and the pastor (Campbell et al., 2000). These process findings tended to support the importance of including interventions aimed at multiple levels when intervening with groups such as faith communities. The fact that the program sustained behavior change during the course of 2 years was indicative of maintenance; however, we did not have the resources to continue to follow the churches during a longer period of time to assess institutionalization and sustainability.

In Health Works for Women, we took a similar approach to reaching lower income and minority women employed in small-to-midsized rural blue-collar industries. Because these industries did not have any health promotion programs or facilities and the production schedule would not allow women time off the line to attend classes, we tested an intervention consisting of a combination of personally tailored communications in the form of women's health "magazines" and a social support natural helping program in the workplace. Women received two individually tailored and workplace-targeted magazines, with tailoring based on assessment of multiple health behaviors (diet, physical activity, smoking, cancer screening) and psychosocial variables similar to those described earlier for the NC STRIDES newsletters. Natural helper training occurred outside of work time to minimize any cost to the company. The monthly trainings focused on providing health information and skill building for the natural helpers to diffuse health messages to other women in the workplace and to organize activities such as healthy lunches and walking groups. The 660 study women who completed the final survey were predominantly African American and high school educated, and approximately half of the respondents were aged 40 years or older. Results of this 18-month intervention show significant improvements in diet and physical activity (Campbell et al., 2002). Process evaluation data indicate that a high

percentage of participants (86%) recalled receiving the tailored materials and approximately 58% of women were aware of and/or participated in the natural helper program. Thus, we had indirect evidence of the relative reach and effectiveness of the tailored and natural helping interventions among this population but could not distinguish between the impact of each separate intervention in leading to the observed study outcomes.

In conducting these two programs, we were working under an assumption that the synergistic effect of intervening with multiple components at multiple levels of change was important for achieving and maintaining change among community participants. Indeed, other researchers have successfully pursued a similar strategy of combining tailoring with other intervention modalities, as exemplified by the following two examples. The first is the Healthy Directions–Healthy Centers Study—a group medical practice–based cancer prevention trial in which 5 of 10 health centers were randomized to receive several intervention components. These included a prescription of behavioral recommendations and study endorsement from the patient’s clinician during an appointment, in-person counseling from trained health advisors after an appointment, four follow-up telephone calls using motivational interviewing, and six tailored print materials (Emmons et al., 2003). Five of the tailored materials were “step-by-step” guides targeting three factors: individual (such as overcoming barriers), interpersonal (such as increasing social support from family and friends for the recommended behaviors), and environmental (such as using community resources). Although results of the trial have not yet been published, it is clear that tailored materials constitute only one of several different intervention activities to target multiple dietary and physical activity behaviors.

A second community-based trial, the Bootheel Heart Health Project, also aimed to improve dietary intake and physical activity (Brownson et al., 2004). In a study that focuses on increasing walking behavior, Brownson et al. (2004) worked with six communities in the “bootheel” region of Missouri to implement a multicomponent intervention aimed at multiple levels of change. In a collaborative effort of community members, organized coalitions, and university researchers, intervention activities included festivals with a focus on health, walk-a-thons, walking clubs, and tailored materials. The tailored materials specifically were a set of eight, one-page tailored mailings that included motivational information for those who did not walk currently and information on maintenance for those who were already walking regularly. Using a 4-item walking behavior scale, 653 participants reported minutes of walking during an approximate yearlong period. Although no statistically significant effects were reported, specific subgroups of participants with lower education and income in the intervention communities reported an average increase per week of 14.8 minutes (those with a high school degree or less) and 16.0 minutes (those with household incomes of less than US\$20,000) compared to those in control communities.

Dismantling the Effect of Tailoring From Other Components

As noted above, the difficulty of studying tailored communications in the context of a multilevel, multicomponent intervention is that even if the intervention is successful, the design seldom allows the researcher to dismantle the effects of each component. We usually ask process evaluation questions at follow-up that are designed to assess participants' perceptions of each intervention component in terms of attributes such as memorability, attention, personal relevance, and perceived impact on behavior. Such questions, however, may fail to capture adequately or accurately the impact of each separate intervention because people often respond in terms of thinking about the program as a whole. In addition, memory may be flawed, especially when working with an older population, because people are exposed to so much information and media that the conscious impact of having received tailored newsletters some months previously may be much attenuated by newer media exposures and experiences.

Based on our demonstrated results of the Black Churches United for Better Health and Health Works for Women multicomponent interventions, therefore, we decided to conduct a partial dismantling study that would examine the relative contribution of two elements that had been included in the previous studies and appeared important from the process evaluations: TPCs (individual level) and natural helper/lay health advising (social network level). Implicit in this approach was the hypothesis that a combination of interventions focused on different levels would prove to be more powerful and effective than tailoring alone. Our findings from this study, the Wellness for African Americans Through Churches (WATCH) project, did not support that hypothesis.

The WATCH project was a church-based research study aimed at improving nutrition, physical activity, and colorectal cancer screening among rural African Americans (Campbell, James, et al., 2004). The aim was to measure the relative effectiveness of two different strategies to promote these behavior changes: (a) individualized tailored print newsletters and targeted videotapes (TPV) and (b) a LHA intervention. As noted above, these strategies were chosen based on process evaluation information from previous research that suggests both approaches had contributed to intervention effectiveness in past programs. The tailoring for the individual-level newsletters was based on stages of change, beliefs, knowledge, barriers, and motivators and also included group-targeted cultural and spiritual elements. The LHA intervention was focused on the interpersonal/social network level of change, identifying and training naturally existing lay advisors to diffuse health information and provide social support for health behavior change among church members. We hypothesized that based on a socioecological framework, combining the strategies into a multicomponent intervention would be more effective than each intervention separately.

The study design was a randomized trial comparing the effectiveness of the two strategies among 587 African American members of 12 rural North Carolina churches. Using a 2×2 factorial research design, we were therefore able to assess the independent and combined effects of these two approaches. The primary prevention

messages of the study encouraged increasing fruit and vegetable consumption, lowering dietary fat, and achieving moderate to vigorous physical activity on most days of the week (150 minutes or more per week). The main screening message was to obtain fecal occult blood tests or other colon cancer screening tests such as sigmoidoscopy or colonoscopy starting at age 50 or earlier if an individual had risk factors. The study encouraged discussion with health providers about appropriate testing and cost issues.

For churches randomized to the TPV and combined intervention arms, members were interviewed by telephone at baseline and their data were used to create four tailored newsletters that were mailed to each participant's home during a 1-year period. Four accompanying mailed targeted videotapes on the same topics—created by the research team—presented motivational testimonials, information, and skills demonstrations designed to help participants initiate changes. In the TPV study arm, the church provided a venue to identify participants; however, the intervention was entirely home based. For the LHA churches, church members identified peers they felt were trusted individuals that others turned to for support and advice. These LHAs attended monthly group sessions for training on health information, support skills, and activity planning. They were then expected to share this information with other church members and to implement a minimum of three churchwide activities during the 1-year intervention period. The control churches received health education sessions on other health topics not related to the study outcomes.

Study results show that the TPV intervention significantly improved ($p < .05$) fruit and vegetable consumption (0.6 servings) and recreational physical activity (2.5 metabolic equivalent task hours) and that among those 50 and older ($n = 287$), a 15 percentage point increase in fecal occult blood test screening (37% TPV vs. 23% control, $p = .08$) was achieved. The LHA intervention did not prove effective on its own, and also surprising, the combination of TPV and LHA was not as effective as TPV alone. Process evaluation measures indicate that roughly 75% of those who received TPV recalled getting the newsletters and the majority read most or all of them. There also was evidence of dose-response relationships for the tailored intervention for at least some behaviors. Those who had read most or all of the tailored newsletters ate more fruits and vegetables at follow-up (3.8 vs. 3.3 servings) and were more likely to get fecal occult blood testing (35% vs. 12%, $p < .01$) compared to those who reported reading little or none. No relationships were found between the amount of videos watched and health behavior changes. In the churches that received the LHA intervention, however, only 10% of respondents reported having spoken with an LHA about health during the intervention period. It is interesting that individuals who had spoken with an LHA about health were far more likely to have obtained an fecal occult blood test compared to those who had not had that contact (48% vs. 26%, $p < .01$).

The results of this trial were somewhat unexpected, in that we had believed that a multilevel approach would be more effective than a “tailoring-only” strategy in terms of both initiating and supporting behavior change among church members. We found, however, that the LHA intervention did not contribute to an additional effect, possibly because of insufficient reach and diffusion within the church. This finding warrants further research, for example, studying the potential of strengthening and enhancing

the interpersonal/social support intervention. One approach to ensuring more one-to-one interpersonal communication might be to include a peer counseling intervention and/or to add other strategies to promote greater reach and dissemination within the church community.

One important finding was that the tailored intervention was memorable and perceived as relevant among church members. It is clear that delivering salient health information to people in their homes is one way to effectively create an impact. But is it sustainable? The likely answer to that question is no, although we did not have the opportunity to follow the churches for longer than 1 year. Because the TPV intervention was delivered by researchers and not “owned” by the community, we may have increased information and motivation, but we did not necessarily increase community capacity to conduct health promotion. In a new study, dubbed “e-WATCH,” we will be examining the feasibility of disseminating the WATCH newsletters and videos among church members via computers and the Web. The aim of this approach, part of a newly National Cancer Institute–funded Community Cancer Networks Grant, will be to establish access to the tailored communications as a resource that could be accessible and sustainable outside of a research study. In this study, part of the LHA training will focus on teaching the LHAs to be computer mentors for fellow members as well as diffusers of health information.

Conclusions and Next Steps

Findings from the studies described in this article have numerous implications for public health research and dissemination as well as next steps in tailoring research in the context of creating better interventions to reduce health disparities. First, head-to-head comparisons of state-of-the-art intervention approaches can provide valuable information that would not be discovered in standard two-group study designs with one group getting a tailored intervention and the other receiving nothing (control). Sometimes the findings are surprising, for example, the unexpected finding in WATCH of a lack of additional impact of adding a lay advisor program to TPCs among church members. Taken together, studies such as WATCH, NC STRIDES, and others reviewed in this article suggest that TPCs may be particularly effective among minority groups such as African Americans. As noted earlier, other research studies are investigating optimal approaches to tailoring health messages to African American audiences, including whether tailoring should focus more on cultural variables versus psychosocial and behavioral constructs and whether certain cultural constructs are more important for tailoring to certain audiences and subgroups of African Americans. Results of these studies clearly will inform the next generation of tailoring research and it is hoped, lead to more powerful and well-specified interventions that can achieve public health impact.

Our knowledge of which tailoring and targeting variables and attributes of messages lead to change is still in its infancy. In the studies described above, we made a number of assumptions regarding what type of tailored communications to use. We

generally made these decisions/assumptions based on qualitative research conducted at the formative stages of the study. We conducted focus groups or qualitative interviews with members of the target audience to determine the salient message characteristics for a given population and attempted to apply this information to inform the message content and wording, choice of graphics and colors, preferred information source (e.g., pastor vs. expert), and so forth. However, because formative research methods such as focus groups provide insights that are not necessarily representative of the larger population, we may conduct qualitative research and still completely miss the mark for at least some participants. And we may never find that out unless we do extensive postintervention evaluation to learn more about people's reactions to the tailored materials. In other words, we may find a lack of effect of a tailored intervention because our tailoring was a poor fit for the target audience (e.g., because we really did not understand the cultural context, because we asked the wrong questions, and/or because the audience was much more diverse than we realized).

Targeting to relevant cultural, spiritual, and community factors appears to increase the salience of tailored communications, especially for minority populations. However, to the extent that many of these targeting variables are community specific, this lessens our ability to disseminate effective interventions without additional extensive modifications for each new community or geographic area. In future projects, we may need to find ways for community agencies and organizations to "self-tailor" portions of tailored communications (e.g., by providing templates into which testimonials and photos from local opinion leaders could be added, by offering choices of color combinations and graphics, and by allowing community members to edit tailored feedback for culturally appropriate language and comprehensibility). The feasibility and effectiveness of this idea of community-driven targeted and tailored communication has yet to be formally tested against researcher-created tailored materials.

We have acknowledged that incorporating tailored materials into multicomponent studies can render the effect of the message indistinguishable from other intervention components. However, this socioecologically based approach may be the only appropriate one for intervening in complex community settings such as churches and blue-collar workplaces. Extending our tailoring research to these types of studies has also allowed us to understand more about the intervention strategies perceived as relevant by individuals from the community and to achieve relatively long-term behavior changes. The trade-off between implementing large-scale multicomponent interventions and conducting in-depth tailoring research may be the issue of whether internal or external validity is paramount. From the standpoint of advancing the field of tailoring research, it is clear that the more narrowly focused tailoring studies that carefully manipulate and test specific variances of tailoring in relatively controlled settings can yield findings with high internal validity that can answer fundamental questions about how and what to tailor. However, from the standpoint of external validity and public health relevance and dissemination, the more complex multilevel approaches may be more defensible. In the real world, health communication does not occur in a vacuum or a laboratory. People are constantly exposed to health information; and to the extent that messages are synergistic and provided via multiple channels (e.g., in print, on the

Web, from interpersonal communication, at work), the effects are likely to be greater and more sustainable. We have begun to scratch the surface of such research in the area of health disparities reduction. Greater participation, engagement, and leadership in research from members of minority groups such as African Americans will be important to further extend our understanding of factors such as the important cultural, spiritual, and community influences on health behavior that may become part of future tailored interventions.

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