



# Challenges for Tailored Messaging in Health Education

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## ABSTRACT

*It is a health education truism that instructional material will be more effective when audience characteristics are taken into account at the outset of program development. One strategy for disseminating relevant health information to individuals is known as “tailored messaging,” which accounts for intra-individual information processing needs. This customized approach to health communication is proposed to catch individuals’ attention and have a positive effect on cognitive-behavioral responses to health information. Because of the increased attention this communication strategy has received within the recent health education literature, this paper (1) revisits the origins of tailored communication, (2) contrasts tailored versus targeted communication, (3) outlines potential problems and weaknesses of tailoring, (4) discusses challenges associated with implementing and evaluating tailored health interventions, and (5) proposes a path and recommendations for the future of tailored messaging in health education. Future research should consider developing empirical models of tailoring to help clarify pathways for successful application. In addition, health education researchers should come to a consensus regarding whether tailoring represents a cost-effective, feasible alternative to targeted messaging.*

## BACKGROUND

It is a health education truism that educational material will be more effective when audience characteristics are taken into account.<sup>1</sup> One strategy that has been proposed to best take into consideration pertinent aspects of individuals is referred to as “tailoring” health information based on individual information processing needs. Tailored communication is a combination of information/change strategies intended to reach one specific person, based on characteristics unique to that person, which are related to an outcome of interest and derived from an individual assessment.<sup>2</sup> This approach entails initially acquiring data from

individuals on selected variables related to information retrieval, processing, and health behavior change. It then uses the information to convey exclusively germane health messages. As Kreuter and Wray<sup>3(p. S227)</sup> explain, “tailored health communication can customize the source, message, and channel used to facilitate communication for each individual, presumably maximizing the relevance of the communication for each person.” This customization is proposed to catch individuals’ attention, meet their information needs and positively affect their cognitive-behavioral responses to health information.

Tailored health communication is de-

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veloped using expert systems, which algorithmically make use of vast message libraries to match messages to individuals based on intra-individual, psychosocial determinants of health behavior.<sup>4,5</sup> Conceptual, theoretical, and/or evidenced based relationships between determinants are used to guide the processing of data gathered from each individual. Tailored health communication efforts have focused on a variety of health issues including nutrition,<sup>6,7,8,9</sup> physical activity<sup>10,11</sup>, and smoking cessation.<sup>12,13</sup> Technological applications, such as computers, streamline the development and transmission process used to distribute customized messages. Computer-tailored health communication has modernized the message creation process immensely<sup>14</sup> and has been evaluated favorably in relation to generic health communication.<sup>15</sup>

## PURPOSE

While tailored health messaging has received both attention and acclaim, the strategy has not always been endorsed without reservation.<sup>16,17,18</sup> To help resolve pending concerns related to tailoring messages in health education, this paper will: (1) revisit the origins of tailored communication, (2) contrast tailored versus targeted communication, (3) outline potential problems and weaknesses of tailoring, (4) discuss challenges associated with implementing and evaluating tailored health interventions, and (5) propose a path and recommendations for the future of tailoring in health education.

## THEORETICAL ORIGINS

Psychological theories and concepts are largely responsible for explaining the influence that attitudes can have on message relevance. Thus, psychological models serve as the underpinnings for tailoring research. The Elaboration Likelihood Model, proposed by Petty and Cacioppo,<sup>19</sup> postulates that there are two ways an individual may come to develop and act on an attitude. The first is through a *central* route, which occurs when an individual scrupulously examines information related to attitudinal object (e.g., health). The second is through a *pe-*

*ripheral* route which directs an individual to accessory cues within a message (e.g., quality of informational source) in order to evoke an attitudinal response. Attitudes which are established through central processes remain more constant over time, are more resistant to contradictory messages, and are more motivating because they encourage the individual to elaborate (i.e., reflect) on the message presented and relate the message back to past experience(s). Conversely, attitudes formed through the peripheral route do not stimulate active consideration of substantive information; therefore, no such introspection usually occurs.<sup>20</sup> In light of this, health education researchers and practitioners want individuals to process information through a central route. It is hypothesized that tailoring information increases the likelihood of central information processing, thus increasing individual motivation to act on health messages.<sup>3</sup> Objective studies of neurological responses to tailored health messages validate this notion, finding that tailored messages stimulate increased attention and careful processing of health information.<sup>21,22</sup>

Message framing is another core tenet of tailored communication. It involves developing messages which illustrate either positive or negative consequences of adopting or failing to adopt a particular behavior. Messages which are “gain-framed” outline the benefits of a behavior, while messages which are “loss-framed” reveal the costs of not engaging in a behavior. Prospect Theory<sup>23</sup> guides the use of these two types of messages and hypothesizes that individuals are risk-seeking when losses are made salient, and risk-averse when gains are made evident. For example, when health behavior involves some risk or uncertainty, individuals are more likely to engage in behavior when the downside of a health condition is discussed; whereas, when a health behavior involves little risk or uncertainty, individuals are more likely to take action when the health benefits of those actions are presented upfront.<sup>24</sup> Prevention behaviors, for the most part, come with little risk attached, so gain-framed messages may be preferable.

Detection behaviors are more likely to be associated with risk or uncertainty, so loss-framed messages should be considered.<sup>20</sup> Research has shown that when individuals are provided health messages commensurate with their own motivational orientation (e.g., positive or negative), they are more likely to examine messages that are strong in nature.<sup>25</sup>

## TAILORED VS. TARGETED HEALTH MESSAGES

*Tailoring* is the creation and distribution of messages for individuals rather than for populations, which distinguishes it from other population-level approaches to health communication. *Targeted* messages are developed as single intervention approaches for population clusters based on homogeneous characteristics shared among members of a subgroup.<sup>5</sup> A targeted orientation directs the practitioner to identify pertinent variables which are important for a majority of program participants, not necessarily for each unique individual. This approach is analogous to the idea of market segmentation which is used throughout marketing circles. Market segmentation seeks to identify groups of individuals who are similar on a variety of significant variables related to the use of a product, service or idea.<sup>26</sup> Segments constitute a subgroup of similar individuals within a larger population. Based on segment delineations, customized, typically identical, messages are developed based on the target subgroup’s profile.

Kreuter and Skinner<sup>5</sup> suggest that the major differences between tailoring and targeting lie in the use of data within each approach and the content distributed to priority populations. Within tailored interventions, individual level data is used to inform the distribution of messages to individuals uniquely and separately; whereas, within targeted interventions, individual level data is used to create a subgroup of similar individuals, so that a unique message can be developed for a unique subgroup of individuals. These separate definitions were supported by Rimer,<sup>27</sup> but challenged by Pasick,<sup>28</sup> who took issue with the above



distinction between the two terms. Pasick<sup>28</sup> suggested that the desire to be culturally responsive in health education rendered an individualistic definition of tailoring unresponsive to the shared characteristics of individual cultures. This idea of culturally competent communication was supported by Rakowski,<sup>18</sup> who emphasized the importance of identifying a cultural focus within health communication before attempting to tailor materials. Rakowski<sup>18</sup> went on to posit that cultural elements lay the foundation for tailoring and enable health behavior researchers to examine the relative and contextual elements of health behavior change.

Kreuter and Skinner,<sup>1</sup> in their response to Pasick's concerns and critique,<sup>28</sup> make clear that the designation of tailoring to individual traits does not ignore the uniqueness of culture; rather, it recognizes that a shared cultural collectivism is not valued equally by all members of one culture. Furthermore, the act of tailoring messages takes into account variation in cultural communalism, which makes the approach ideally suited for cultures or populations which exhibit some level of variation on determinants influential in the behavior change process. As Kreuter and Skinner<sup>1</sup> (p. 508) put it, "whenever there is individual-level variation... on a belief or construct that influences health or behavior, there is at least the possibility of enhancing communication effectiveness by customizing appeals to each individual." While this is true, tailored health messages should have the greatest advantage over targeted messages when there, "is significant variability within the target audience on key determinants of the intended behavioral outcome."<sup>3</sup> (p. 5228)

## PROBLEMS

### Research Efficacy

The evidence in support of tailoring has not been devoid of some data which raises questions regarding the efficacy of tailoring health messages.<sup>16,17,18</sup> Some studies report little-to-no improvements in outcomes when tailoring health messages.<sup>8,10,29,30</sup> This could be due to the differential applica-

tion of tailoring technology and/or how different people respond to tailored versus non-tailored material. To explain the variation in the effect of tailoring, studies have attempted to compare the effectiveness of tailored versus non-tailored messages. These studies have suggested that tailoring health information can improve the effectiveness of health messages.<sup>4,31</sup> Findings from these studies, however, may not be generalizable, given the methodological strategies employed during their data analyses. Type I error probability was inflated in both studies due to the execution of multiple one-way analyses of variance (ANOVAs) on numerous dependent variables. The researchers<sup>4,31</sup> elected not to report implementing a statistical correction to account for the increased experimentwise error probability present in these investigations.

This may or may not be cause for alarm. However, it should be noted that the authors of these studies,<sup>4,31</sup> and previous foundational work,<sup>32</sup> did not explicitly justify why the use of multiple univariate ANOVAs best answered their research questions regarding the effectiveness of tailored messaging. Huberty and Morris outline situations when the use of multiple ANOVAs may be appropriate, including when dependent variables are "conceptually independent" and when the research being conducted is, "exploratory in nature... so as to reach tentative, nonconfirmatory conclusions."<sup>33</sup> (p. 303) While the research conducted in the aforementioned studies<sup>4,31,32</sup> did test new treatment strategies (tailored communication), the outcome variables seem to all be from a related domain (mostly cognitive). Given the complex nature of health information processing, a multivariate analytical model allows the researcher to simultaneously examine multiple treatments affecting multiple outcomes. Tatsuoka notes that, "any variable taken in isolation may affect the criterion differently from the way it will act in the company of other variables... [and] overlooks the fact that [the simultaneous nature of] multivariate analysis can throw light on how each one contributes to the relation."<sup>34</sup> (p. 273) Huberty and Morris<sup>33</sup> (p. 304)

go on to state that, "because of the nature of behavioral science variables, redundant information will usually be obtained with multiple ANOVAs." Accordingly, a multivariate model of reality is a better fitting analytic model in a multi-causal world of multiple effects.<sup>35</sup> Thus, perhaps there is a need for more multivariate studies to help confirm or disconfirm the relative utility of tailoring in health education.

To help make this argument more concrete, it is useful to look at a few related studies from the literature. For example, one study<sup>31</sup> examined the effects of tailored versus non-tailored weight loss education. Non-tailored materials and individual characteristics were examined post-hoc to determine whether non-tailored materials represented a "fit" to participants' personal characteristics (purely by happenstance). A series of one way ANOVAs using four grouping variables (tailored vs. good fitting; non-tailored vs. moderately fitting; non-tailored vs. poor fitting; non-tailored) was conducted to explain participants' perceptual and cognitive responses to weight loss education. There were 14 separate perceptual rating and 15 different cognitive response dependent variables. No adjusted alpha ( $\alpha$ ) level was used to test the 29 null hypotheses testing differences in outcomes across the treatment groups. Therefore, the reporting of statistically significant results could possibly have been biased, given the probable non-perfect bivariate correlations between the 29 dependent variables under investigation. Correlations between these 29 cognitive response outcomes were not reported within the text, so the reader is left to presume dependent variable relationships. In effect, of the 11 statistically significant results reported,<sup>31</sup> across both perceptual ratings and cognitive responses, only 2 remained statistically significant after implementing a bonferroni adjustment to correct the test wise  $\alpha$  from 0.05 to the experiment wise  $\alpha$  of 0.002 (experiment wise  $\alpha = 0.05 / 29$ ) (Table 1). While a bonferroni type correction has been noted to be too severe in reducing power against Type II error,<sup>35</sup> the effects of implementing this sort of correc-



tion indicate that results from this study are, at a minimum, susceptible to Type I errors. Furthermore, the overarching conclusion from this study that tailored approaches, “are more effective than non-tailored materials in most, but not all cases”<sup>31(p.305)</sup> would seem to at least be debatable. What is a bit more dubious is that findings from this,<sup>31</sup> and other univariate studies,<sup>4</sup> are solely being cited and reported in subsequent works examining the effects of tailored versus targeted communication.<sup>36</sup> Multivariate analysis of variance (MANOVA) followed by descriptive discriminant analysis seems to be a worthy alternative for these situations where there are numerous outcome variables being examined.

In a related vein, studies have attempted to link other individual cognitive characteristics to tailored message receptivity. For example, individuals possessing an internal locus of control, as opposed to an external locus of control, have been identified as es-

pecially interested in tailored messages.<sup>32,37</sup> One of these studies,<sup>32</sup> however, should be interpreted with caution, as the scale used to assess locus of control had a low measure of reliability ( $\alpha = 0.49$ ). In addition, multiple univariate ANOVAs increased the likelihood of Type I errors across all experiments. Five separate two-way, two-level (study group-tailored vs. non-tailored weight loss materials; locus of control-internal vs. external) ANOVAs were conducted to examine main and interaction effects on five presumably semi-related cognitive responses to weight loss education. It is interesting to note that, again, intercorrelations between cognitive response outcomes were not reported, so the reader is left to deduce dependent variable relationships. This information would have been extremely useful, especially if there existed high correlations between the dependent variables, which would have, in turn, reduced the inflation of Type I error probability.<sup>38</sup> Regardless, since these out-

comes were most likely correlated to some non-perfect degree (as outcome variables are nearly always interrelated non-perfectly), the use of multiple ANOVAs probably yielded at least some redundant information affecting subsequent tests.<sup>33</sup>

**Cost**

Some authors have suggested that tailored, computerized interventions are preferred due to their relatively low delivery costs.<sup>2,14,31,39,40</sup> While this may be an advantageous trait of tailored interventions, it is important to note that the developmental costs of tailored message interventions have not been validated through systematic, econometric evaluation. Lairson and colleagues<sup>17</sup> demonstrated, through their cost estimation of a tailored intervention to promote mammography screening, that cost effectiveness may not be a trait of tailored message interventions. Using a societal perspective to estimate intervention cost (i.e., accounting for all costs for all personnel

**Table 1. Statistically Significant Findings<sup>31</sup> Adjusted to Account for Type I Error Probability Inflation**

Perceptual Ratings of Weight Loss Material across four treatments				
Participants report...	F statistic	Reported P value	Bonferroni-Adjusted P Critical Value ( $\alpha$ / # of tests)	Maintain statistical significance?
The materials caught their attention.	F(3, 196) = 6.24	P < 0.001	0.002	Yes
The materials were attractive.	F(3, 196) = 5.14	P = 0.002	0.002	Yes
The materials were informative.	F(3, 196) = 3.86	P = 0.01	0.002	No
The materials were useful.	F(3, 196) = 4.35	P = 0.005	0.002	No
They liked the materials.	F(3, 196) = 4.90	P = 0.003	0.002	No
The information in the materials was trustworthy.	F(3, 196) = 2.99	P = 0.03	0.002	No
They would read materials again in the future.	F(3, 196) = 4.74	P = 0.003	0.002	No
They would make behavioral changes based on materials	F(3, 196) = 3.64	P = 0.014	0.002	No
Cognitive Responses to Weight Loss Material across 4 treatments				
Participants report...	F statistic	Reported P value	Bonferroni-Adjusted P Critical Value ( $\alpha$ / # of tests)	Maintain statistical significance?
Total positive thoughts	F(3, 189) = 3.24	P = 0.02	0.002	No
Personal connections, moderate and positive	F(3, 188) = 4.65	P = 0.004	0.002	No
Behavioral intention, moderate and positive	F(3, 189) = 2.65	P = 0.05	0.002	No
Self-assessment, positive	F(3, 189) = 3.11	P = 0.03	0.002	No



**Table 2. Problems Associated with Tailored Messaging in Health Education**

1. Some studies comparing the efficacy of tailored versus targeted interventions may be moot due to potential for Type I errors across experiments<sup>4,31,32</sup>
2. Tailoring may not be cost effective<sup>17,41</sup>
3. Public awareness of health problems may limit the effectiveness of tailored health communication

involved in developing the intervention), Lairson et al. estimated that the cost of a tailored messaging system could run upwards of \$250,000. Due to the cost considerations inherent within this and other robust tailored interventions,<sup>41</sup> it is suggested that more cost effectiveness studies be conducted to report costs not considered when only accounting for delivery expenditures.<sup>16,42</sup> This type of empirical validation seems necessary, because tailored communications may not make a public health impact unless proven to be practical and cost-efficient.<sup>16</sup>

#### *Public Health Awareness*

The level of public health awareness in a given population may also cause problems for the practitioner looking to tailor health messages. Tailored communication may not be particularly suitable for addressing health problems in which awareness or understanding is initially low in the target population. For example, tailoring has had little effect on individuals' immediate impressions of breast cancer messages and initial intentions to receive mammography screenings.<sup>37</sup> From these results, we see that there are instances where tailoring messages cannot ameliorate lack of awareness regarding a novel health topic. Thus, if there is an unrelenting use of tailoring regardless of an individual's previous exposure to health information, there lies the possibility of exhausting excess discretionary resources during the formative stages of message development. In situations where health knowledge is predominantly low, such discretionary funds may be better allocated to aid in the transmission of basic health information. Because of the complex

and unknown nature of tailored message comprehension, targeted messages covering general health information may be preferable in situations where it is known that populations are less informed on a particular health issue.<sup>3</sup>

#### **CHALLENGES**

##### *To Tailor or Target Health Messages?*

Much is left to learn about message effectiveness as it relates to implementing a tailored versus a targeted approach to health communication.<sup>3</sup> Studies are needed which identify optimal segmentation strategies (e.g., tailored versus targeted) for health communication and health education interventions. In certain cases, targeted health communication has been shown to be as effective, if not more effective, than tailored messaging;<sup>5</sup> however, there is not a wealth of recent studies which have pitted the two communication strategies against one another. This suggests that there is an important task at hand in regards to identifying the level of relevance for which a population of interest best responds to a particular health message. There lies a challenge in both tailoring and targeting research to identify the "active ingredients"<sup>20</sup> which truly produce the unique message effects caused by each strategy. Tailored messages have traditionally been based on data encompassing multiple, personal characteristics related to a single health issue; consequently, it has been a challenge for researchers to attribute health communication success to one individual message ingredient. Once the specific ingredients at work within tailored messages can

be identified, then we may be able to truly understand when, where and why tailoring may be preferable to targeting. In addition, an optimal dose model for tailoring has yet to be established,<sup>2,42</sup> which places researchers at a disadvantage when projecting the necessary complexity needed when developing tailored health interventions.

##### *Which Variables Should be Considered? Cultural Variables?*

To the author: another suggestion. Perhaps change the title or re-arrange the paragraphs to define culture and cultural variables in the first paragraph? The flow does not seem logical to me.

Classic health behavior theories provide researchers input regarding which particular variables should be utilized when developing tailored interventions. Practitioners are encouraged to acquire data on variables such as individual readiness to change behavior, perceptions of barriers impeding behavior change and motivation to initiate change.<sup>20</sup> Biological and clinical variables, such as genetic susceptibility and pre-existing comorbid conditions, have also been identified as tailoring variables.<sup>14,18</sup> Normally, these types of variables are used concurrently to develop more relatable health messages, as the concomitant use of multiple variables allows researchers to augment the significance of messages. When developing tailored interventions, the thoughtful researcher is encouraged to examine the multitude of concerns facing each individual target population, and then provide theoretically and/or empirically based arguments for variables that are selected for tailoring.<sup>18</sup>

To date, researchers have tailored health messages using many different variables, but have not systematically evaluated which variables are most important to tailor and what combinations of variables are most effective for different health conditions and/or behaviors. Moreover, little is known about the exact variables which should be tailored.<sup>15</sup> A renewed focus should be placed on determining which variables should be used to tailor messages for the variety of health conditions that exist.<sup>14</sup> Research has focused largely on tailoring health information based



on “behavioral construct tailoring,” which uses variables such as attitudes, beliefs, barriers, and self-efficacy to help develop tailored health messages.<sup>43</sup> Influences such as culture have largely been ignored. It has been suggested that the role of culture is one characteristic that should be accounted for within the tailoring process.

*Culture* refers to values and beliefs shared within a significant community of individuals.<sup>28</sup> *Cultural tailoring* refers to the development of interventions, strategies, messages and materials which conform to specific cultural characteristics possessed by a subgroup of individuals.<sup>44</sup> Constructs used in cultural tailoring have included spirituality, familial involvement, racial pride, and temporal orientation. These varying cultural influences may be very important to measure when developing tailored interventions, as these variations may foreshadow true values within a priority population. While the potential for culture as a tailoring variable is most certainly plausible, it is a bit of a paradox to imply that culture should be integrated into tailored health messaging. Culture is a collection of shared values; so, if a characteristic is not shared, then it cannot necessarily be considered cultural.<sup>28</sup> Due to this inconsistency between tailoring and culture, Kreuter and colleagues<sup>45</sup> advocate for acknowledging the shared cultural atmosphere of groups and subgroups by classifying divergent levels of cultural indoctrination among individuals. When level of cultural assimilation is considered at the individual level, there exists the potential for wide variability in terms of cultural attitudes and beliefs. The challenge for future health educators will be to accurately classify culture without directly associating culture with assumed stereotypes, as these characterizations may overlook key personality dissimilarities among cultural constituents. The overarching goal of health message dissemination should be to transmit health messages in a context sensitive to bona fide diversity within cultures and subcultures.

Although there has been a call for tailoring health messages based on cultural variables, the utility of cultural tailoring

**Table 3. Challenges Associated with Tailored Messaging in Health Education**

1. Figure out which “active ingredients”<sup>20</sup> should be considered when tailoring educational materials for individuals<sup>15</sup>
2. Identifying optimal segmentation strategies for tailored health education<sup>5</sup>
3. Establishing optimal dose model for tailoring<sup>2,42</sup>
4. Evaluating the effectiveness of cultural tailoring
5. Exploring the use of interactive technology to streamline tailoring efforts<sup>50</sup>

has not been shown to be effective in the literature. Champion and colleagues<sup>46</sup> report that tailored communication was ineffective in prompting African-American women to screen for breast cancer. Kreuter and colleagues<sup>43</sup> corroborated this finding, showing that tailoring based on cultural outlook alone had little positive effect when promoting mammography and adequate fruit intake to African-American women. These findings suggest that it may be best to segment similar populations based on shared cultural characteristics and frame messages which are culturally *targeted* rather than culturally *tailored*. Furthermore, *cultural targeting* is preferred when little cultural variability exists within a group of individuals.<sup>45</sup> It is important to note, however, that cultural tailoring may become more viable in future interventions geared towards underserved populations. Campbell and Quintiliani<sup>47</sup> speculate that individuals with low literacy and less access to health information may especially benefit from culturally sensitive, tailored health communication.

**COLLECTING DATA**

Since tailoring can only be done when data has been acquired from a priority population, there must be a mechanism in place initially for gathering information on the determinants of health behavior change.<sup>3</sup> Interactive health communication offers the potential for more tailored messages, in a variety of different formats. Evidence from interactive tailoring through

direct personal input of data has yet to be conclusive in regards to how it compares with traditional print communication tailoring;<sup>47</sup> however, it is anticipated that process evaluations of tailored message interventions will continue to examine interactive tailoring as a data collection strategy. What’s more, telecommunication technologies may facilitate new mechanisms for tailoring messages that reach groups in need of specialized communication.

**Future of Tailoring in Health Education**

Exploration of New Tailoring Strategies Rimer and Kreuter<sup>42(p.S195)</sup> suggest that the capacity of tailoring technology presents countless opportunities to explore “how and under what conditions tailoring works and [how] its effects can be optimized.” The need for redefining tailoring approaches is growing<sup>16</sup> and may be satisfied as more and more health educators are encouraged to adopt a marketing mindset.<sup>48</sup> Kreuter and colleagues speculate that using mass communication channels to disseminate health information could eventually become irrelevant in favor of methods which distribute information on a large scale but without the generic flavor of past public health education material.<sup>2</sup> While many studies have assessed the effects of single tailored messages on individual health behaviors, the effects of tailoring on multiple health behaviors has been far less examined.<sup>14</sup> Recent work by Smeets, Kremers, de Vries, and Brug<sup>49</sup> assessed the effects of computer-tailored feedback on numerous health behaviors. Tailored feedback was

**Table 4. Future Opportunities for Tailored Health Interventionists**

1. Confirm the utility of tailoring versus alternative health communication strategies
2. Integrate the use of new technologies into tailored health interventions
3. Determine the optimal scope of tailoring technology
4. Develop and operationalize quality control guidelines for tailored health interventions
5. Model the pathways of tailored health message receptivity and comprehension

distributed to participants regarding several health behaviors (smoking, physical activity, and nutrient intake) in either a tailored or generic format. Results showed that the tailored feedback group viewed messages more favorably for all behaviors except smoking. However, the effect sizes quantifying these effects only ranged from .10 to .12 (note: all except for smoking). These small effects may be best explained by Kroeze, Werkman, and Brug,<sup>50</sup> who speculate that elaborate tailoring aimed at multiple behaviors may be too extensive for people to process. Accordingly, more research needs to be conducted to help determine when tailoring, “has reached a point of diminishing returns.”<sup>18(p.288)</sup>

### Quality Control

There has been little attention paid to evaluating the true quality of tailored health interventions. Specifically, there is a need for more research examining the effects of message diffusion, especially for diverse populations.<sup>47</sup> One such intervention conducted by Jerant and colleagues<sup>41</sup> made use of interactive multimedia computer programs to deliver colorectal screening messages. These messages were presented using a variety of texts, narration and video based on users' distinct needs and preferences. Users exposed to tailored multimedia interventions revealed a statistically significant increase in screening self-efficacy and readiness to engage in screening activity. Studies such as this one, and others,<sup>51,52</sup> suggest that the identification and specification of quality, tailored multimedia messaging may be achieved through the development of core

processes which enable message generation for specific populations. Unfortunately, the empirical literature provides little guidance to practitioners who wish to create and test tailored messages.<sup>53</sup>

Given that studies are mixed in terms of what exactly tailoring effects along the path to behavior change, empirical models (such as those generated by structural equation modeling) can clarify the pathways which start with exposure to tailored messages and lead to behavior change. More refined theories and models must breakdown steps in the behavior change process (e.g., message reception, acceptance, yielding and impact) once users are exposed to customized messages. Once steps are identified, interventions can address “access” points along the behavior change continuum.<sup>42</sup>

### TRANSLATION TO HEALTH EDUCATION RESEARCH AND PRACTICE

Throughout this discussion of tailored messaging in health education, various topical areas have arisen. The literature base continues to support the examination of this emerging communication technology. With the emergence of this approach and its related technologies, tailoring may become more readily used to disseminate health information to society at large. The ongoing materialization of tailoring will most likely provide growing opportunities for health education interventionists. However, before these opportunities are embraced fully, the empirical literature must establish whether or not tailoring represents a productive, cost

effective, and feasible alternative to targeted messaging. Do individual approaches supersede collective or community approaches in regards to both relevance and salience? Does the interactivity of new “virtual” communication technologies (e.g., social networking, blogosphere, etc.), render individualized, tailored messaging as somewhat of a depreciating fad? These are important questions to answer, as many models of behavior change emphasize the power of group involvement, support and buy-in.

Further, we must at least question the unremitting promotion of tailored approaches to health communication, because the actual evidence suggesting its superiority over targeting is ambiguous. Perhaps this ambiguity has precluded the widespread adoption of tailoring as the health communications practice of choice, as one would be hard-pressed to proclaim that tailoring has “taken off” in the field of health education. Nevertheless, if proven to be a superior health communications strategy, the integration effects of tailored messaging could potentially prove indispensable in the quest to distribute relevant health information for all.

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