Mass Media in Health Promotion: An Analysis Using an Extended Information-Processing Model
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Information-Processing Model

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ABSTRACT: The information-processing model of the attitude and behavior change process was critically examined and extended from six to 12 levels for a better analysis of change due to mass media campaigns. Findings from social psychology and communications research, and from evaluations of mass media health promotion programs, were reviewed to determine how source, message, channel, receiver, and destination variables affect each of the levels of change of major interest (knowledge, beliefs, attitudes, intentions and behavior). Factors found to most likely induce permanent attitude and behavior change (most important in health promotion) were: presentation and repetition over long time periods, via multiple sources, at different times (including "prime" or high-exposure times), by multiple sources, in novel and involving ways, with appeals to multiple motives, development of social support, and provisions of appropriate behavioral skills, alternatives, and reinforcement (preferably in ways that get the active participation of the audience). Suggestions for evaluation of mass media programs that take account of this complexity were advanced.

We are increasingly learning about how lifestyles affect health. Accordingly, there is a growing consensus regarding the need to promote positive health behaviors on a large scale basis. The rising costs of traditional health care increases the need to find the most effective method of modifying health behaviors. One approach which has generated much enthusiasm is the use of mass media campaigns. The last decade has seen an increasing number of attempts to use mass media campaigns to influence the public.

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for their own good in the areas of disease prevention, health promotion, and public safety. Some of the substantive areas addressed, together with selected illustrative references and reviews of them are as follows.

1. **General Health**, of which the Stanford Three Community Heart Disease Prevention Project,4-6 the North Karelia Project,7-9 and the “Feeling Good” television series produced by the producers of “Sesame Street,” but with a health promotion focus and targeted to adults,10 are probably the most well known;

2. **Safety**, especially driving,11-14 seat belt use,15,16 and lawn-mower safety;17

3. **Smoking**;18-22

4. **Alcohol and Drug Abuse**;23-25

5. **Family Planning**;26-28

6. **Programs in Third World countries**;29-33

7. **Miscellaneous areas such as cancer control**,34 immunization,35 screening,36 compliance,37 mental health,38 and lung disease.39

Unfortunately, assessing the effectiveness of many of these programs is difficult. Of the numerous mass media health promotion campaigns that have been mounted, only some have been reported in public outlets. Most have been described only in internal reports not generally available to the public and some have not been documented at all. Few media campaigns have been formally evaluated and, of those evaluations undertaken, many have turned out to be uninterpretable or invalid because of unresolved methodological, technical, administrative, and/or political issues.11,40,41 This happens not for want of adequate methodology. The tools of evaluation research in general are well established.42-59 The problem seems to be lack of an adequate appreciation of either a) these tools and methodologies, or b) the complexity of the attitude/behavior change process. As a result, the interpretation of most of those evaluations of mass media programs which have been carried out has been ambiguous or impossible.

It has proven unusually difficult to develop methods of influencing the public to change their attitudes, and especially their behaviors, to improve their health status. Of those media campaigns successfully evaluated, only a few demonstrated successful behavior change.4-6,13,18,22 Most have been found to be unsuccessful in influencing attitudes and behavior for any length.
of time. cf. reviews 15,21,27,50-65 We suggest that part of the reason for this lack of success is the absence of systematic application of known communication principles in the design and evaluation of mass media programs.

This paper presents a model of the attitude/behavior change process which can serve as a guide for assessing the substantive adequacy of mass media programs as well as having relevance to evaluation strategies. Initially McGuire's information processing model of attitude change is described and then examined in terms of knowledge from social psychology and communication research and its potential relevance to health promotion. Finally a more detailed, extended model of the communication/change process is suggested.

THE INFORMATION PROCESSING MODEL

The most well developed and researched model of the communication process is the classic information-processing model of general attitude and behavior change first developed at Yale by Hovland and hence often known as the Yale or Hovland model. It has been elaborated upon and extensively advocated by McGuire, who has suggested a "persuasion matrix" as a way of conceptualizing the change process and understanding the complexities of the relationships between outcomes (changes in knowledge, attitudes, and behavior), and inputs (the persuasive communication and its properties).

Communication Factors

The columns of McGuire's persuasion matrix are factors which locate, alone or in combination, the independent variables (or inputs) of most general attitude change studies. These include:

1. Source factors—the attributes of the perceived source of the message;
2. Message factors—the content, structure and style of the message;
3. Channel factors—the medium used, and how it is used;
4. Receiver factors—the characteristics of the audience receiving the message;
5. Destination factors—the target issue, the target component of general attitude, and whether the change is long-term or short-term, etc.

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It is suggested here that any review or evaluation of the potential effectiveness of mass media programs needs to consider each of the above elements of the communication process. A comprehensive review of how source, message, channel, receiver and destination variables affect general attitude change in laboratory studies has been provided by McGuire, and summarized by Roberts and Zimbardo, Ebbesen, and Maslach.

The Stochastic Change Process

The rows of McGuire's persuasion matrix represent common dependent variables (outcomes) in general attitude change studies and, according to McGuire, also constitute six steps in the stochastic process of general attitude change. The six steps suggested by McGuire are:

1. Being presented with the persuasive message (exposure);
2. Attending to the message (awareness);
3. Comprehending its content (knowledge);
4. Yielding to its appeal (beliefs/attitudes);
5. Retaining this new position (persistence of attitude change; and
6. Acting on the basis of it (behavior).

The complete information-processing model may, therefore, be represented as in Figure 1.

![Figure 1. McGuire's persuasion matrix.](http://heb.sagepub.com)
It is generally assumed that belief (cognitive) changes will automatically lead to attitude (affective) and behavior (conative) changes, apparently because of a need for psychological consistency. This is not the only possible order of change however.

Ray has provided a systematic analysis of the different orders of change and suggests three basic “hierarchy of effects” models of communication response in terms of cognitive, affective and conative elements. The appropriateness of each model for a particular situation is most dependent upon the factors of involvement, differentiation of alternatives, and communication source. The three hierarchies are:

The low-involvement hierarchy in which learning new information leads directly to behavior change which subsequently produces attitude change (i.e., cognitive-conative-affective). The low involvement hierarchy would be likely to occur when, as its name implies, there is a low involvement on the part of the target audience and minimal differences between alternative behaviors. This would be a typical situation for many consumer choices. For example, an individual is not tremendously concerned about what brand of soap he buys and if costs are close he should choose that brand with which he is most familiar (has been exposed to or has had favourable experiences with). This behavior will then be followed by positive attitudes if the soap is found satisfactory.

The dissonance-attribution hierarchy in which behavior occurs first (the consumer is forced to make a choice on the basis of some non-media source) leading to attitude change as a function of dissonance or self-attribution, and then selective learning consistent with the original behavior (i.e., conative-affective-cognitive). This situation should most likely occur when the target audience is involved but there is little difference among alternatives.

The learning hierarchy in which cognitions are altered which leads to a change of attitude which then determines the appropriate behavior (i.e., cognitive-affective-conative). According to Ray, this hierarchical ordering should most likely occur when the target audience is involved and there are clear differences between alternatives.

Although there are no doubt exceptions, and the communication itself can be structured to affect involvement and differentiation of alternatives, the learning model (i.e., cognitive-affective-conative hierarchy) would seem most
appropriate to health promotion campaigns. Changing health relevant behaviors typically involves important adjustments by individuals and so the alternatives (e.g., quitting vs. continuing smoking) are highly differentiable. Further, involvement should be high where the potential importance of the behavior for personal welfare is known. For these reasons it is suggested that typically the information-processing model is appropriate for mass media health promotion programs.

The following briefly presents findings from social psychology and communications research as they relate to each stage of the stochastic change process and compares these with findings from health promotion campaigns. In view of these considerations the adequacy of McGuire’s model is assessed and an extended version of the information-processing model is proposed.

**KNOWLEDGE FROM SOCIAL PSYCHOLOGY AND COMMUNICATION RESEARCH**

**Presentation of the Message**

It should be relatively easy to change people's awareness of certain issues as long as they can be exposed to information. Although few evaluations have bothered to measure exposure or awareness, many health promotion programs have probably failed because they did not reach their target audience. A major problem here is the potential for selective exposure, that is the tendency for persuasive appeals not to reach those to whom they are directed. For example, a program aimed at increasing awareness of nutritional requirements may only be watched by those already interested in nutrition who probably have a reasonable knowledge of the subject, while those who are relatively uninformed, and thus uninterested, watch something else. In the presentation of the message then, although a popular media (channel) is selected, pre-existing audience (receiver) factors may preclude exposure. For this reason, one of the basic techniques of advertising is to insert a message which is novel, shocking, and/or entertaining (to ensure attention) into a specific program which is already determined to have a large audience (to ensure exposure).

**Attention and Comprehension**

In order to change people’s knowledge they have to be motivated to attend to and to comprehend the information being
presented or else the information has to be repeated so many times that it becomes "lore."

Theories of learning (attention and comprehension in the present context) and research on instructional media are well established and have already been thoroughly reviewed elsewhere. Although many of the hundreds of studies done with instructional media are methodologically so poor as to be uninterpretable, it appears that any media can lead to improvements in knowledge just as well as face-to-face instruction, but not necessarily any better, and that no one form of media is consistently better than another. An important implication, however, is that media, especially radio, are much cheaper, and therefore more cost-effective than face-to-face instruction.

The above findings are macro-level ones. Micro-level findings are few: a) programs must be directed at a felt need (to ensure attention); and b) hearing a program in groups and discussing it afterwards leads to better understanding.

Yielding and Retention

There are vast literatures on belief and attitude change within both the areas of social psychology and communications research. A confusing, and sometimes contradictory, array of findings and theories has been generated. This confusion was somewhat reduced when McGuire provided a thorough conceptual review of the area.

For changes due to a health promotion campaign to be meaningful, they must persist over long periods of time. It has been suggested that many of the changes in belief and attitude reported in the literature might have been no more than responses to immediate situational demands and did not represent meaningful change at all. This fundamental issue was addressed recently when Cook and Flay provided a review of the conditions under which attitude change persisted over time.

The findings from the Cook and Flay and McGuire reviews, together with summaries by Roberts and Zimbardo et al., provide the clearest picture of the conditions most conducive to meaningful and persistent changes in attitude that can be derived from the social psychological and communications research literatures. These conditions may be summarized as follows.

A persuasive message has most impact if it:

1. comes from multiple sources of high credibility (i.e., trustworthiness and expertise) and similarity (a property of the source);
2. is repeated *often* and *consistently* (message);
3. is sent via *multiple* media at accessible times and locations (channel);
4. arouses or is accompanied by a high level of a) *personal involvement* in the issue and b) *consistency* with related attitude and value structures (receiver);

Finally, two other factors which appear to fall outside of McGuire’s communication variables but which have been found to be important are:

5. a high level of *social support* or acceptance in the receiver’s environment; and
6. opportunities to give expression to the newly formed attitudes, and ongoing *reinforcement* for doing so.

There are other conditions that appear to be conducive to meaningful and persistent attitude change. Many of these involve interactions between the components of the communication process (e.g., between message and receiver factors, such as higher fear arousal being more effective for less anxious receivers, or an explicit conclusion being more effective with a less intelligent, uninformed audience). They are reviewed best by McGuire.69

**Acting**

Some researchers have relied on expressions of intention as indicators of behavior, while others have assessed only behavior. For this reason both concepts are treated together here.

The available information on meaningful and long-term behavior change is much more sparse and scattered than that on knowledge, belief, and attitude change. Within psychology, researchers have only recently begun to investigate the conditions necessary for the long-term maintenance of changed behaviors.96 Examples of recent statements regarding health-related behaviors are Wilson99 for the treatment of obesity, Best18,100 for smoking cessation, and Marlatt & Gordon101 for various addictive behaviors, including alcoholism and smoking.

The consensus about the factors that contribute to long-term change may be summarized as:

1. specific target behaviors to be changed—a non-specific program cannot effect specific changes;
2. a desire to change, which most clients in behavior change programs already have96—for mass media programs to be successful they must be either targeted at people who already have this desire or else they must motivate the desire;
3. the provision of multiple alternative behaviors as coping responses in those situations where the undesired behavior would normally be practiced;¹⁸,¹⁰²
4. a concern with making the social environment supportive;¹⁸,¹⁰³,¹⁰⁴ and possibly
5. an emphasis on self-management of the behavior change.

It is apparent that the above factors do not readily fall into McGuire's communication categories. Recall that the assumption underlying the model was that changing attitude automatically should produce behavior change. This point shall be considered further when an extension of the information-processing model is proposed.

FINDINGS FROM EVALUATED MASS MEDIA PROGRAMS

Despite the limitations of past evaluations, preliminary reviews of those mass media programs that have been evaluated suggest some conditions that seem to affect the likelihood of media campaigns being effective.¹¹,¹³,¹⁵,²⁰-²³,⁶⁰-⁶³,⁶⁵

Conditions conducive to effective belief or attitude change appear to be:

1. arousing involvement in the issue and/or motivation to change;
2. much repetition by several sources, via multi-media, over long periods of time (i.e., years, not weeks or months);
3. novelty in the way the message is presented (in order to maintain attention and increase the chance of arousing involvement);
4. targeting very specific issues and providing consistent alternative attitudinal structures; and
5. high quality production of materials (equal to that of commercial mass media production) to ensure attention.

It is encouraging to note that the above factors are very similar to those derived from the social-psychological and communications research theories and findings.

Mass media campaigns have been even less successful at changing behaviors than at changing beliefs or attitudes. At least this is so for specific target behaviors—there is some question about the influence of the media on behavior in a more general way.⁶⁶ Few of the mass media health promotion campaigns listed
earlier that have been evaluated have demonstrated successful behavior change, especially over the long term. Those which have had success however, usually included additional elements in their overall program which involved identifying alternative (healthy) behaviors and/or specifying the development of personal skills necessary to performing these behaviors. These objectives were pursued in various ways including combinations of the following:

1. incorporation of information pertaining to behavioral alternatives and skills development within the communication message itself;
2. promotion of interaction with the audience (e.g., via telephone or written materials);
3. supplementation with face-to-face clinics; and
4. mobilization or restructuring of community resources (e.g., cooperation with the dairy industry to develop low-fat dairy products in the North Karelia project).

**IMPLICATIONS: EXTENSION OF THE INFORMATION PROCESSING MODEL**

Generally McGuire's model offers a good paradigm for the planning and assessment of mass-communication/health-promotion campaigns. However, certain deficiencies can be demonstrated concerning the validity of the assumption that changes in knowledge and beliefs will automatically lead to changes in attitude and ultimately behavior. This is directly relevant to the appropriateness and comprehensiveness of the model for assessing and planning health promotion strategies based on mass communication approaches.

**Differentiating Concepts**

We agree with McGuire that the general attitude change process is a stochastic one involving several steps. However, work in social psychology on the attitude-behavior consistency problem would suggest that the steps involved in changing knowledge and/or beliefs ought to be differentiated from those involving attitudes, intentions, and behaviors.

Although the distinction between knowledge and belief is not definitive we may generally discriminate these concepts in the following way. *Knowledge* can be defined as factual information, whereas *belief* pertains to the degree to which one subjectively
accepts an association between some object or behavior (e.g., smoking) and an attribute or consequence (e.g., lung cancer). Knowledge is taken as a given or universal truism; belief is a personal estimate of subjective probability that reflects varying degrees of certainty. This is not to say that a change in knowledge will not lead to a change in beliefs. It clearly sometimes will, and this is what McGuire calls acceptance or yielding (changing ones beliefs on the basis of new knowledge).

According to Fishbein’s formulation an attitude is conceived of as an evaluative (affective) response toward some object or act, and this response is based upon an underlying set of beliefs where each is weighted by the value placed upon the associated attribute (viz. an object) or expected outcome (viz. an action). Thus an attitude reflects the net value (or affect) that is associated with this underlying set of beliefs. This value-expectancy formulation underscores the potential complexity of the belief–attitude connection. For example, an apparently highly relevant belief change (smoking is carcinogenic) may not lead to the expected attitude change (smoking is bad for me) if an individual’s personal expectation for the negative outcome (cancer) is low, or if expected positive outcomes (smoking relaxes me) are numerous.

Behavioral intentions may be defined as one’s personal estimate of the subjective probability of performing a certain behavior (or class of behaviors). According to Fishbein, attitude is only one of two major factors which will affect an individual’s intention to engage in a behavior. Beliefs concerning what important others (e.g., peers, relatives) want us to do will also determine our intentions.

Finally, it is recognized that behavior, the specific act or set of acts which are the focus of concern, will be directly related to intention only in so far as extraneous factors which may interfere with the behavior are not present. Thus, other considerations such as situational constraints, social support systems, skills, alternative behaviors, etc. may affect the intention–behavior connection.

How does McGuire’s model (Figure 1) match up with the concepts of knowledge, beliefs, attitudes, intentions, and behavior (KBAIB) identified above? Clearly, attention and comprehension have to do with knowledge, and action has to do with behavior. But are yielding and retention concerned with beliefs or attitudes (affective) or both? From McGuire’s writings it is not altogether clear. In places it seems as if he would agree with Cartwright who classified beliefs together with knowledge as part of the cognitive structure, attitudes and values under a motivational structure, and
intentions, behaviors, and supportive environments as part of the behavioral structure. In other places, however, he suggests that yielding leads to attitude change. However, when it comes to operationalizing measurement of each step, McGuire seems to think of attitude change as being cognitive as measured by an "opinionnaire." What is clear, is that the information-processing model is most appropriately concerned with changes in Cartwright's cognitive structure, especially beliefs. Once changes in knowledge and beliefs have been brought about, it is assumed that changes in attitudes, intentions, and behavior will automatically follow, apparently because of a need for consistency. Thus McGuire's model does not directly address issues of attitude and behavior change.

Similarly, although McGuire considers as important the retention of memory of message content or (depending on which source you read) the new belief, he does not consider the maintenance of new behavior. Since maintaining a certain behavior is often the basic goal of health promotion attempts, it must be an integral aspect of any model in this area.

The above differentiation reveals a hierarchy of potential change areas. It is generally assumed that changes in beliefs are usually more difficult to obtain than changes in knowledge, changes in attitude are probably more difficult to obtain than changes in belief, and long-term behavior change is usually more difficult to obtain than attitude and intention change. For example, practically all smokers now know of the association between smoking and certain diseases (knowledge); most of them, but not all, accept that smoking causes cancer (belief); fewer, though still a large proportion, agree that smoking is bad for them personally (attitude) and desire (have intentions) to stop; but a large proportion of these people still do not stop smoking (behavior).

**Extending the Model**

Considering the above points we suggest the adaptation of the information-processing model as shown in Figure 2. The arrows from one dependent variable to another in Figure 2 suggest a casual chain where:

- exposure will lead to awareness, *but only when the message is attended to*;
- awareness will lead to changes in knowledge, *but only when the message is comprehended*;
- changes in knowledge will lead to changes in beliefs, *but only if the arguments or conclusions of the message are accepted or yielded to*; and
changes in beliefs might (hence the dashed arrows) lead to changes in attitude, intentions, and ultimately behavior.

This makes it clear that other factors play a major role in determining the particular behavior engaged in.

As we have seen from the above reviews, factors relating to the receiver's environment, such as social support, opportunity to express attitudes, and reinforcement for behavior, are important in translating attitudes or intentions into action. Until now these factors have been given little attention in mass communications, although it is feasible that they could be addressed. For example, a persuasive message regarding "quitting smoking" could be targeted towards families or other relevant social groups rather than individuals; or messages could be aimed at convincing people to support those who are trying to quit. Furthermore, it is necessary for the target individual to be given the skills necessary to change a particular health behavior if his or her intention is to be translated successfully into action. Although these skills can be thought of as receiver characteristics, they are typically absent in those to whom the communication is addressed. However the inclusion of skill training within the context of a persuasive message has been attempted infrequently at the mass communication level. Thus other approaches, such as value-expectancy formulations,\textsuperscript{107,108} the

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FIGURE 2. A reconceptualization of the information processing model of the general attitude change process.

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health belief model,\textsuperscript{109} value self-confrontation procedures,\textsuperscript{110,111} Fishbein's behavior prediction model,\textsuperscript{89} Cartwright's motivational and behavioral structures,\textsuperscript{77} and social learning theories\textsuperscript{112,113} that take into account other factors affecting change (e.g., values, social support structures, and behavioral skills and alternatives) appear to be necessary for a comprehensive model of the attitude and behavior change process.\textsuperscript{114}

In considering his model for attitude change, and the empirical evidence relevant to it, McGuire\textsuperscript{69} was not certain whether all levels of change had to occur for meaningful and persistent attitude change to occur. Consideration of the model in respect of the five KBAIB concepts, suggests that change is not necessary at all levels in order for meaningful change to occur in any one of KBAIB. For example, changes in beliefs or attitudes can occur without changes in knowledge or behavior. Sometimes changes in behavior can even occur without accompanying changes in beliefs or attitude. However, in real-life situations (as opposed to the laboratory) it seems clear that meaningful and long-term change in any one element of KBAIB is more likely if there is also corresponding change in the other four elements. For example, as would be predicted from the many consistency theories in social psychology,\textsuperscript{115} changes in beliefs or attitude are more likely to persist if they are accompanied by corresponding changes in knowledge and behavior.\textsuperscript{96} Changes in behavior are more likely to be maintained if the underlying cognitive and motivational structures are consistent with the new behavior. Even changes in knowledge are probably more likely to be retained if other experiences, as represented by the corresponding beliefs, attitudes, and behavior, are consistent with it.

**Implications for Evaluation**

The complexity of the extended information-processing model implies that a comprehensive mass media program should meet all the conditions suggested above to maximize effectiveness. Similarly, a comprehensive evaluation of a mass media program should measure outcomes, and their antecedent variables, at all levels of the 12 stage change process. In past evaluations, interpretation has been especially difficult in those cases when the program apparently failed. If the major outcome measured was health status or behavior, then failure could be located at any one of the other steps in the change process. Did it fail because people were not exposed to it, did not attend to it, did not understand it, did not accept or yield to it, etc.? Assessments of behavior and health status may answer questions of impact, but without answers
to questions of implementation and process, questions about why a program was or was not effective cannot be answered. In addition to the types of questions above, questions of treatment (the source, the message, and the channel), the receiver (audience), and the context should also be asked in a comprehensive evaluation. Finally, it should be emphasized that there needs to be a correspondence between the mass media content and the particular outcome measures assessed. In some programs, very general interventions have been planned and then were evaluated by very specific outcome criteria. General interventions (e.g., good nutrition) should be assessed by multiple-act criteria since people may respond in any number of "correct" ways. On the other hand, if very specific outcomes are desired (e.g., checkups for high blood pressure), then the intervention content must be appropriately specific and the corresponding single-act criterion assessed. As we have seen, the failure to do methodologically adequate evaluations means that the findings from mass media campaigns to date, as opposed to the "field-wisdom", are scarce.

**SUMMARY: A PROFILE FOR SUCCESSFUL MASS MEDIA PROGRAMS**

The ultimate, long-term objective of any health promotion mass media program must be to change people's lifestyles (behavior), or to prevent negative lifestyles, and consequently improve their long-term health status. Although there is still some question about whether or not all 12 steps of the persuasion process are necessary to lead to behavior change, we suspect that they are necessary if permanent behavior change, and therefore changes in health status, are to be effected. Thus, any change attempt, mass mediated or not, should aim to end up with consistency both within and between cognitive, motivational and behavioral structures. That is, consistency across knowledge, beliefs, attitudes, intentions, and behavior must be sought. In addition, more general values and social norms may also need to be considered.

For some issues, some of the steps in the persuasion process may already be consistent with the behavior desired by the health promoter. In such cases, the consistent knowledge and/or beliefs, for instance, need only be reinforced and the message can concentrate on attitudes and behavior. A good example is that most smokers already know of the association between smoking and lung cancer, accept (believe) that it is probably a casual link,
and feel that smoking is bad for their own health and desire to stop. In that case any (health promotion) change strategy need only reinforce the consistent knowledge, opinions, attitudes, and behavioral intentions, and concentrate on changing behavior.

However, in all cases the first requirement is to reach the target audience. Many programs have probably proved ineffective because not enough people were exposed to it. Airing spots on public television or at non-peak hours on commercial television does not ensure good exposure. Presentations via multi-media, at different times, over long periods are necessary simply to get exposure.

Once exposure is achieved, it is no use reaching people’s living rooms if they do not attend to the message. Appeals to multiple motives (e.g., to improve health, to improve social and/or self esteem, to decrease cost of living, to improve quality of life); in novel ways; with repetition across sources, channels, and times; will help get attention. An expert (who is perceived as credible and trustworthy), yet similar, source who presents a clearly targeted, concise, easily understood message will also increase attention, as well as ensure comprehension.

Acceptance of, or yielding to, the message is also more likely if the source is credible and similar and presents the message in an arousing and involving (i.e., motivating) way. Changes in attitudes and intentions are more likely if that source also offers social support, and asks for (and gets) active participation (answer a questionnaire, keep a diary, etc.). Repetition in many ways, involvement, active participation, and social support, all together, also increase the likelihood of persistent changes in attitudes and intentions. This has been found to be true for the laboratory, as well as in the real world with the long-term effects of smoking campaigns.

Many of the factors mentioned above will increase the chance of behavior change consistent with all the other changes. However, the chances of behavior change are maximized only when explicit ways to change are provided. This means providing the appropriate behavioral control and behavioral skills, as well as appropriate alternative behaviors for those situations where the old behavior took place. New behaviors will only be maintained over time if an appropriate social support structure (e.g., spousal support for persons losing weight) is available and the new behaviors are positively reinforced at least on a decreasing random interval basis.

In conclusion, this review has demonstrated that the earlier pessimism about the effectiveness of mass media in health
promotion\textsuperscript{15,21,61-65} should now give way to a cautious optimism and more sophisticated development. Our analysis suggests that the use of mass media may sometimes be as successful as face-to-face interventions if the appropriate components (e.g., skill training) are included in the communication. However, an optimally effective campaign may need to incorporate yet other approaches to behavior change.

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