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# Systematic Development of Trans-Theoretically Based Behavioral Risk Management Programs\*

Galen E. Cole, David R. Holtgrave and  
Nilka M. Rios\*\*

## Background

Nine of the ten leading causes of mortality in the U.S. have a behavioral component.<sup>1</sup> These nine account for more than eight million years of potential life lost (YPLL) before age 65 as shown in Table 1 below.<sup>2</sup>

The relationship between behavioral factors and major causes of mortality is increasingly clear. For example, it has been demonstrated that the modification of a fatty-rich diet, smoking and alcohol abuse can substantially reduce associated health risks, promote well-being and increase longevity.<sup>3</sup>

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<sup>1</sup> National Center for Health Statistics, *Advanced Report of Final Mortality Statistics, 1989*, 40(8) MONTH. VITAL STAT. REP., Supp 2 (1992).

<sup>2</sup> *Adapted from Centers For Disease Control, Years of Potential Life Lost Before Ages 65 and 85 — United States, 1989-1990*, 41 M.M.W.R. 313 (1992).

**Table 1**  
**Sample of Behavioral Components, Death Rates and Years of Potential Life Lost Before Age 65 for the Ten Leading Causes of Death, U.S. 1990**

<i>Cause of Death</i>	<i>Behavioral Component</i>	<i>Rate/100,000</i>	<i>YPLL-65</i>
1 Diseases of the heart	Smoking, diet, sedentary life	289.0	1,349,027
2 Malignant neoplasms	Smoking, diet	201.7	1,839,900
3 Cerebrovascular diseases	Diet, blood pressure	57.9	244,366
4 Unintentional injuries	Alcohol, safety belts, helmets	37.3	2,147,094
5 Chronic obstructive pulmonary disease	Smoking	35.5	127,464
6 Pneumonia and influenza		31.3	
7 Intentional injuries (Suicide/Homicide)	Alcohol, stress	22.5	1,520,780
8 Diabetes mellitus	Diet, obesity	19.5	143,250
9 Chronic liver disease and cirrhosis	Alcohol	10.2	212,707
10 HIV infection	Inject drugs, multiple sex partners	9.6	644,245
	<i>Total</i>		8,228,833

Consequently, behavioral scientists have been enlisted by public health leaders to develop behavioral risk management programs. These programs incorporate behavior change strategies for preventing or reducing behavioral health and safety risks associated with the major causes of mortality. The underlying assumption is that “lifestyle factors that affect well-being and quality of life can be controlled.”<sup>4</sup>

### Justification

The process of selecting or designing a behavioral risk management program can vary considerably as a result of a number of highly subjective factors. Some of these factors include such things as who is selecting or developing the intervention; what experience and training the individual or group has; what intervention(s) the person or group is familiar with; biases of the designer(s); the number of interventions available; political feasibility; and the availability of resources such as

<sup>3</sup> B.Q. HAFEN, A.L. THYGERSON & K.J. FRANSEN, *BEHAVIORAL GUIDELINES FOR HEALTH & WELLNESS 1* (1988).

<sup>4</sup> *Id.*

time, money and scientific literature. These factors can result in the selection or development of interventions which do not rely on the best theory and applications behavioral scientists have to offer. Thus, interventions are prone to be less than they could be and oftentimes result in modest impact which, in turn, can result in modest support.<sup>5</sup>

Behavioral scientists have devised theories, models and paradigms to help describe fundamental processes of human behavior. Some of these theories are the Theory of Reasoned Action,<sup>6</sup> the Social Learning Theory,<sup>7</sup> the Health Beliefs Model<sup>8</sup> and the PRECEDE Framework.<sup>9</sup> These theories can assist those responsible for developing behavioral risk management programs in their attempts to formulate the most suitable intervention for their purposes.

Although many of these models have proved useful, they are relatively inflexible in not accounting for advances in the state-of-the-art of behavioral science. Thus, although these models are useful in providing a structured approach to intervention development, the structure can become self-defeating in the face of advancing behavioral technology that better accounts for previously unexplained variance.

In view of the limitations connected with relying on a single model or paradigm, some behavioral scientists have adopted a trans-theoretical approach to intervention development.<sup>10</sup> Rather than relying on any one theory, they choose among the most salient factors or features of the assorted behavior change theories for a given research situation. However, in doing this they can lose the benefit of the structure

<sup>5</sup> L.W. GREEN & F.M. LEWIS, MEASUREMENT AND EVALUATION IN HEALTH EDUCATION AND HEALTH PROMOTION 139 (1986).

<sup>6</sup> M. FISHBEIN & I. AJZEN, BELIEF, ATTITUDE, INTENTION AND BEHAVIOR: AN INTRODUCTION TO THEORY AND RESEARCH (1975).

<sup>7</sup> A. BANDURA, SOCIAL LEARNING THEORY (1977).

<sup>8</sup> I.M. Rosenstock, *Historical Origins of the Health Belief Model*, 2 HEALTH ED. MONOGRAPHS 328 (1974).

<sup>9</sup> L.W. GREEN & M.W. KREUTER, HEALTH PROMOTION PLANNING: AN EDUCATIONAL AND ENVIRONMENTAL APPROACH (1991).

<sup>10</sup> J.O. Prochaska & C.C DiClemente, *Stages and Processes of Self-Change of Smoking: Toward an Integrative Model of Change*, 51 J. CONS. & CLIN. PSYCH. 390 (1983).

provided by the theoretical model which the factors are derived from. Hence, the trade-off for increased flexibility is a loss of structure provided by a theoretical paradigm.

Interventions need to be based on a scientifically sound foundation in order to impact their target population. Furthermore, they should be sufficiently flexible so they can accommodate advances in knowledge about how to change behavior. Moreover, behavioral scientists should not feel obligated to adhere to any one particular model. In fact, no one theory is universally applicable. Behavioral scientists may need to combine dimensions from multiple theories (or at times build entirely new theories) in order to guide the construction of meaningful interventions for their particular situation. In this regard, a “trans-theoretical” approach is preferred. However, as mentioned above, because the practice of choosing factors from various models during the process of intervention development lacks structure, there is a need to somehow develop a technique which retains the flexibility of the trans-theoretical approach without losing the structure derived from theoretical models. Thus, we have developed the guide described in the remainder of this paper. It should help health professionals (particularly program/risk managers, policy makers and behavioral scientists) design and evaluate behavioral interventions.

### **The Behavioral Intervention Planning Guide**

The guide we have developed (BIPG) is a trans-theoretical behavioral risk management strategy which uses a matrix-structured framework to assist public health practitioners in the systematic development of interventions to address factors relevant to changing health-endangering behaviors. The principal advantage of this approach is that it combines the flexibility of a trans-theoretical approach with the structure of a paradigm. Moreover, it does not restrict the intervenor to one behavioral model in the process of determining the factors most relevant in accomplishing behavior change. Instead, it encompasses the stated principles of several models (the trans-theoretical model) in an attempt to be thorough and comprehensive.

Besides structuring a trans-theoretical approach to behavioral intervention; the BIPG also incorporates an interdisciplinary strategy. It is primarily the responsibility of policy makers, program administrators and behavioral scientists to carry out the steps in Phase 1; whereas Phase 2 specifically requires persons with training in behavioral sciences. Finally, Phase 3 involves program managers in assessing the viability *a priori* and the effectiveness *a posteriori* of the prevention program. Behavioral scientists should also contribute to the last phase by assisting in evaluation.

### Description of BIPG Process

As shown in Table 2, each phase of the BIPG process has several steps. Completion of all phases and steps are suggested for systematic development and implementation of a trans-theoretically-based behavioral risk management program.

#### *Phase 1*

The *purpose* of the behavioral risk management program under design is decided in Phase 1. The steps carried out within that phase are to: (A) formulate the health objective, (B) determine whether human behavior is important in achieving the objective — this may require a literature review, (C) determine whether a behavior change program is to be undertaken, (D) determine the client's decision that is being targeted and (E) determine the communication strategy to be used (the communication strategy is a major component of the overall behavior risk management program). The communication component can have one of three purposes: *informational, persuasive or decision-making partnership*.

• *Step A. Formulate the health objective.* The health objective is integral to the goals of a public health program and should identify what intervention is designed to achieve. Objectives should be: (1) specific, (2) attainable — based on realistic objectives and expectations, (3) prioritized — if limited resources are an issue, (4) measurable — to evaluate program effectiveness and (5) time-specific.<sup>11</sup> A format for

<sup>11</sup> NATIONAL CANCER INSTITUTE, MAKING HEALTH COMMUNICATION PROGRAMS

writing objectives is: To <action verb> <desired result> <time frame>. <sup>12</sup> For instance: To <increase> <human immunodeficiency virus (HIV) counseling and testing by 50% in individuals identified at high risk in a target area> <within one year>.

**Table 2**  
**Phases, Steps and Participants of the BIPG Process**

<i>Phase</i>	<i>Steps</i>	<i>Participants</i>
1	<p>A. Establish health objective.</p> <p>B. Establish whether behavior is important in achieving health objective (i.e., relative importance of behavioral and non-behavioral factors).</p> <p>C. Establish whether a behavior change program is to be undertaken.</p> <p>D. Determine the client's decision that is being targeted.</p> <p>E. Establish the communication strategy to be used in the intervention (e.g., informational, persuasive or decision-making partnership).</p>	<p>Policy makers</p> <p>Program managers</p> <p><i>Behavioral scientists</i></p>
2	<p>A. Use matrix to list universe of factors that might influence behavior of interest.</p> <p>B. Use matrix to list universe of variables for each factor.</p> <p>C. Use matrix to identify ways to measure each variable.</p> <p>D. Use matrix to list important indicators as determined by the assessment tools.</p> <p>E. Use matrix to prioritize the "important" factors. (optional)</p> <p>F. Use matrix to identify interventions for each "important" factor.</p>	<p><i>Behavioral scientists</i></p>
3	<p>A. Assess <i>a priori</i> viability of program using formative evaluation research.</p> <p>B. Implement most viable program.</p> <p>C. Engage in activity, effectiveness and economic evaluation research to establish effectiveness of prevention program.</p> <p>D. Feedback results to inform refinement of intervention and contribute to the behavioral science base in general.</p>	<p>Program managers</p> <p><i>Behavioral scientists</i></p>

WORK: A PLANNER'S GUIDE 9 (1989).

<sup>12</sup> R.T. FRANKLE & A.Y. OWEN, NUTRITION IN THE COMMUNITY: THE ART OF DELIVERING SERVICES 80 (1978).

• *Step B. Determine whether behavior is important in achieving the objective.* To determine objectively whether behavior is important in achieving the health objective, one must first seek an empirical relationship between the target behavior and the health objective. This can be done through literature review or through consulting experts.

In the process of determining a relationship between behavior and the health objective, it is also helpful to consider epidemiologic criteria for causation. These principles are useful in evaluating or “judging” the likelihood that a relationship is causal in nature. Both Trout<sup>13</sup> and Mausner<sup>14</sup> have suggested epidemiologic criteria for determining causation. Taken together, these criteria call attention to: (1) the strength of the association (relative risk) — the excess risk of developing a disease after a given exposure, (2) the dose-response relationship (gradient effect) — the higher the level of exposure, the greater the manifestation of disease, (3) consistency (repeatability), (4) temporal correctness — the risk factor must precede the onset of disease, (5) specificity — one-cause-one-effect relationship and (6) biological plausibility (logical). If a causal association can be established on the basis of these criteria, the behavior in question should be considered a risk factor for the target disease or health objective.

• *Step C. Determine whether a behavior change program should be undertaken.* Several points should be considered before starting a program, including (1) fiscal and human resource availability; (2) the nature of the relationship between the behavior and health objectives; (3) target behavior resistance to change because of, e.g., associated pleasure, frequency of exposure to behavior-inducing cues, availability of resources needed to engage in the behavior and acceptability of the behavior;<sup>15</sup> (4) the amenability of environmental variables to change and (5) community acceptability of the behavioral change program.

<sup>13</sup> K.S. Trout, *How to Read Clinical Journals: To Determine Etiology or Causation*, 124 CAN. MED. ASSOC. J. 985 (1981).

<sup>14</sup> J.S. MAUSNER & S. KRAMER, *EPIDEMIOLOGY — AN INTRODUCTORY TEXT* 180 (1985).

<sup>15</sup> W.A. SMITH, M.J. HELQUIST & G.B. MACDONALD, *CONTROLLING AIDS THROUGH HEALTH PROMOTION* (1992).



A behavior change program cannot operate in a void; it requires support from other institutions. Collaborative agreements with a network of agencies that have similar missions or goals should provide additional assistance when fiscal and human resources are limited.<sup>16</sup>

• *Step D. Determine the client's decision to be targeted.* Health risk communication strategies are more likely to be effective if the communicator understands the target behavior and its antecedent cognitive states.<sup>17</sup> It is crucial for the health/risk communicator to know what information the receiver needs to comply with the health recommendations. For example, it makes little sense to devise and implement a radon communication campaign without knowing what radon-related information homeowners actually need. Are they trying to decide whether or not to have their home tested for radon? Are they choosing among strategies for reducing the radon level in their basements? These two decision-making problems require quite different messages. If you don't know the choices people are faced with, then you don't know if the information has relevance to them.

The decision of whether or not to voluntarily adopt health-relevant recommendations should be consistent with the organization's overall mission/goals and related to the proposed interventions. Therefore, it should be in line with the health objectives.

Perhaps the most relevant questions which the intervenor should consider in executing this step in the BIPG process are: (1) Which health issues are we concerned with? (2) Is the client aware that the problem is affecting him/her? (3) What is the purpose to be achieved? (4) What interventions can we realistically offer?<sup>18</sup>

• *Step E. Determine the communication strategy to be used in the behavioral intervention.* Communication plays a central role in behavioral risk management programs. However, it should not be assumed that all forms of communication are effective. On the contrary, it has been established that certain types of communication are

<sup>16</sup> *Id.*

<sup>17</sup> B. Fischhoff, *Making Decisions About AIDS* in PRIMARY PREVENTION OF AIDS 168 (V.M. Mays, G.W. Albee & S.F. Schneider eds. 1989).

<sup>18</sup> NATIONAL CANCER INSTITUTE, *supra* note 11.

ineffective and, in some instances — such as when information is inconclusive, controversial, contradictory and subject to change — may be counterproductive. In view of this, care should be given to developing or adopting the health communication strategy with the greatest potential for informing, influencing and motivating the target audience to voluntarily decide and, in turn, act in accordance with the recommended health actions.<sup>19</sup>

Three communication models which illustrate the different approaches to health communication are the informational, persuasive and decision-making partnership models.<sup>20</sup> The purpose of the informational communication model is to simply convey information. The goal of the persuasive model is to employ any and all ethical means available to convince the target individual/audience to take action to reduce risk. And finally, the purpose of the decision-making partnership communication strategy is to provide support to clients as they make the best informed decision about accepting the intervention.<sup>21</sup>

Deciding on which communication strategy to use will depend largely on the seriousness of the condition we are trying to avert and to what extent the surrounding community is affected by the target health-endangering behavior(s). A general rule which can be used to make this determination is exemplified in a statement by Hochbaum wherein he claims:<sup>22</sup>

In programs which address themselves to problems which affect only the health of individuals and do not seriously affect the health of others, there should be maximal respect for the individual's right to adopt or not to adopt

<sup>19</sup> *Id.*.

<sup>20</sup> V. Covello, D. Von Winterfeldt & P. Slovic, *Risk Communication: A Review of the Literature*, 3 RISK ABSTRACTS 171 (1986); E.J. Emanuel & L.L. Emanuel, *Four Models of the Physician-Patient Relationship*, 267 J. A.M.A. 2221 (1992); W.J. McGuire, *Theoretical Foundations of Campaigns* in PUBLIC COMMUNICATION CAMPAIGNS 43 (R.E. Rice & C.K. Atkin eds. 1989) and NATIONAL RESEARCH COUNCIL, IMPROVING RISK COMMUNICATION 294 (1989).

<sup>21</sup> Covello, *supra* note 20; Emanuel, *supra* note 20; G.M. Hochbaum, *Ethical Dilemmas in Health Education*, Health Education, March-April 1980; McGuire, *supra* note 20 and NATIONAL RESEARCH COUNCIL, *supra* note 20.

<sup>22</sup> Hochbaum, *supra* note 21.

recommended behaviors. The more seriously individual behaviors threaten the health and welfare of others, however, the more the health educator (behavioral scientist) is justified and even obligated to turn to more forceful means that may go so far as to support legal or other coercion.

Application of this rule in the present context would dictate that in those instances where the surrounding community is threatened by a serious behaviorally-related health problem a persuasive communication model would be justified. This will be explored below in an example section.

### *Phase 2*

Phase 2 of BIPG uses a matrix framework shown in two Figures in an Appendix to this paper to guide the intervenor through steps to determine the behavioral factors addressed by the behavioral risk management program. These are to: (A) specify host (internal) and environmental (external) conceptual factors which are conceivable determinants of health-impairing personal behaviors (column 1); (B) specify essential variables and attributes of each factor which are deemed to be important in explaining the behavior — as in Phase 1: Step B this may require a review of the literature and/or consulting relevant behavioral science experts (column 2); (C) select or design a composite of measurement indicators (assessment tool) that correspond with each of the factors identified in Step 1 and administer this instrument to the target individual/population (column 3); (D) list the variables determined to be important (column 4); (E) assign an importance rating (optional) to the variables (column 5); and (F) select or design intervention components which address the variables considered to be important determinants of health-impairing behavior (column 6).

- Step A. Specify host (internal) and environmental (external) conceptual factors. Enumerating factors entails the specification of those internal and external factors considered to be determinants of health-endangering behavior. Factors we consider important in attempting to change health-relevant behaviors are shown below in Tables 3<sup>23</sup> and

<sup>23</sup> References corresponding to listed factors (unless otherwise indicated, full citations appear earlier in this note): **Knowledge:** A. Bandura, *Perceived Self-Efficacy in the Exercise of Control Over AIDS Infection* in 13 EVAL. & PROG. PLAN. 9 (1990); A. Bandura, *Social Cognitive Theory of Self-Regulation* in 50

4.<sup>24</sup> Their presence or absence can often instigate or inhibit healthy

ORG. BEHAV. & HUM. DEC. PROCESS 248 (1991); M.H. Becker & J.G. Joseph, *AIDS and Behavioral Change to Reduce Risk: A Review*, 78 AM. J. PUB. HEALTH 394 (1988); M.H. Becker, *Theoretical Models of Adherence and Strategies for Improving Adherence* in THE HANDBOOK OF HEALTH BEHAVIOR CHANGE 5 (S.A. Shumaker ed. 1990); J.A. Catania, S.M. Kegeles & T.J. Coates, *Towards an Understanding of Risk Behavior: An AIDS Risk Reduction Model (ARRM)*, 17 H. ED. Q. 53 (1990); T.J. Coates et al., *Behavioral Factors in the Spread of HIV Infection* in 2 AIDS S239 (supp. 1 1988); K.M. Cummings, M.H. Becker & M.C. Maile, *Bringing the Models Together: An Empirical Approach to Combining Variables Used to Explain Health Actions*, 3 J. BEHAV. MED. 123 (1980); W.W. Darrow & K. Siegal, *Preventive Health Behavior and STD* in SEXUALLY TRANSMITTED DISEASES 85 (K.K. Holmes ed. 1989); M. Howard, *Postponing Sexual Involvement Among Adolescents* in 2 SEX. ACTIVE TEENAGERS (1988); E. Maticka-Tyndale, *Sexual Scripts and AIDS Prevention: Variations in Adherence to Safer-Sex Guidelines by Heterosexual Adolescence*, 28 J. SEX RESH. 45 (1991); M.K. O'Keefe, S. Nesselhof-Kendall & A. Baum, *Behavior and Prevention of AIDS: Bases of Research and Intervention*, 16 PERS. SOC. PSYCH. BULL. 166 (1990); R.M. Page & G.E. Cole, *Fishbein's Model of Behavioral Intentions: A Framework for Health Education Research and Curriculum Development*, 5 INT. Q. COMM. H. ED. 321 (1984-85); D.L. Rugg, M.F. Hovell & L.R. Franzini, *Behavioral Science and Public Health Perspectives: Combining Paradigms for the Prevention and Control of AIDS* in PSYCHOSOCIAL PERSPECTIVES ON AIDS: ETIOLOGY, PREVENTION, AND TREATMENT 17 (L. Temoshok & A. Baum eds. 1990) and D. Silverman, A. Perakyla & R. Bor, *Discussing Safer Sex in HIV Counselling: Assessing Three Communication Formats*, 4 AIDS CARE 69 (1992). **Attitudes, Beliefs and Core Values:** Bandura (1990); Bandura (1991); Becker (1988); Becker (1990); Catania; Coates; Darrow; S.A. Eraker et al., *Smoking Behavior Cessation Techniques, and the Health Decision Model*, 78 AMER. J. MED. 817 (1985); C.K. Ewart, *Social Action Theory for a Public Health Psychology*, 46 AMER. PSYCH. 931 (1991); D.L. Goodwin et al., *Predicting Adherence to Prescribed Regimens Using the Health Perceptions Questionnaire (HPQ)* in THE HANDBOOK OF HEALTH BEHAVIOR CHANGE 64; O'Keefe and Page. **Life Adaption Skills:** Bandura (1990); Catania; Coates; Ewart; O'Keefe and Rugg. **Psychological Disposition:** Bandura (1990); Bandura (1991); Becker (1990); Catania; Coates; Darrow; Eraker; Ewart; R. Lau et al., *Channeling Health: A Review of the Evolution of Televised Health Campaigns*, 7 H. ED. Q. 56 (1980); Page; S.R. Rose, *Working with Groups — Social Skills Training in Middle Childhood: A Structured Group Approach*, J. Spec. Group Work, Nov. 1987, at 144 and D. Stockols, *Establishing and Maintaining Healthy Environments: Toward a Social Ecology of Health Promotion*, 47 AMER. PSYCH. 6 (1992). **Physiology:** Bandura (1990); Becker (1990); Eraker; Ewart; Goodwin; Howard and O'Keefe.

<sup>24</sup> References corresponding to listed factors (unless otherwise indicated, full citations appear, *supra* note 23): **Social Support:** Bandura (1990); Catania; Coates; Ewart; O'Keefe; Rose; Rugg and Stockols. **Media:** Bandura (1990); Eraker;

behaviors. For example, the presence of self-efficacy in connection with a target behavior increases the likelihood that the behavior will be espoused and performed while the absence of this factor would, in turn, inhibit the likelihood of engaging in the behavior.

**Table 3**  
**Sample of Internal Factors and Variables**  
**that Advocate or Oppose Behavior**

<i>Internal Factors</i>	<i>Variables</i>
Knowledge	Knowledge of health/disease? Knowledge of health risks? Knowledge of steps which can be taken to avoid risks (desired actions)? Knowledge of benefits associated with taking action to reduce risks?
Attitudes, Beliefs and Core Values (ABCs)	Perceived personal vulnerability? Perceived seriousness of the threat? Perceived efficacy of recommended health action (outcome expectations)? Perception of how significant others will feel about recommended behavior? Value person places on approval by others? Extent of self-efficacy? Locus of control?
Life Adaptation Skills	Knowledge, skills, and dispositions enabling persons function in their society?
Psychological Disposition	Anxiety? Depression? Self-esteem? Assertiveness? Emotional stress? Motivation?
Physiology	Immune status? Appearance? Motor skills? Energy level?

O'Keefe and Page. **Socio-Cultural, Economic, Political:** Bandura (1990); Becker (1988); Catania; Coates; Darrow; Ewart; O'Keefe; Page and Stockols. **Biologic:** Ewart and Stockols. **Health Care System:** Cummings; Ewart and Stockols. **Environmental Stressors:** Ewart and Stockols. **Societal Laws and Regulations:** Ewart and Stockols.

The factors listed in Tables 3 and 4 are not exclusive; others may be involved. Nevertheless, an important advantage of our process is its offering flexibility to incorporate other factors into the matrix at the discretion of the behavioral scientist.

**Table 4**  
**Sample of External Factors and Indicators that**  
**Advocate or Oppose Behavior**

<i>External Factors</i>	<i>Variables</i>
Social Support	Support from family? Support from friends? Support from institutions?
Media	Television? News? Radio?
Socio-cultural, Economic and Political	Religious and community customs and traditions (social norms)? Socioeconomic status? Delegation of authority?
Biologic	Provision for adequate biologic functioning? Exposure to health hazards?
Health Care System	Emergency services? Health promotion? Disease prevention? Diagnostic and treatment? Rehabilitation? Acceptability? Accessibility?
Environmental Stressors	Institutional climate? Familial? Educational? Occupational? Adequate socialization? Provision for maintenance of order?
Societal Laws and Regulations	EPA? Drinking and driving laws? Effort required to perform behavior?

• *Step B. Specify essential variables and attributes of each factor deemed to be important in explaining the behavior.* Just as health status is multi-dimensional, the factors considered important in explaining

health frequently have multiple dimensions, as well as a number of different attributes within each dimension. Therefore, as was described above, the second step of Phase 2 is to specify as many essential variables as are deemed to be important — this may require a literature review — in explaining the behavior at hand. These variables should be listed in column 2 in the BIPG matrix.

- *Step C. Select or design a composite of measurement indicators (assessment tool) that correspond with each of the factors.* The process of identifying and recording the variables associated with each factor specified in column 1 will only be useful to the extent that these variables can be measured. If they cannot be measured, it is impossible to know whether observed cognitive or behavioral changes, over time, can be attributed to the behavioral risk management intervention. For this reason, it is imperative to identify or develop measurement indicators for each variable listed in column 2.

Common indicators include responses to a composite index or set of measures; rating of an observed behavior on a continuum or in one of an ordered series of categories; Likert-type scales<sup>25</sup> designed to order people on attitudes; a semantic differential scale used to rate a given concept on a series of seven-point, bipolar rating scales; scales used to assess attitudes, values and norms; responses to personal interview questions; answers to focus group questions; mortality and morbidity statistics; and notifiable disease statistics.<sup>26</sup> To complete the BIPG process, each measurement indicator or assessment tool should be listed in column 3. These instruments should have cut-points that can be used to establish whether factors are important or not.

Because more than one indicator is usually required to assess each factor, the various indicators are typically combined in some form of assessment tool or data collection instrument. Prior to constructing an assessment tool, however, it is wise to ascertain whether an instrument like the one you plan to develop already exists. If a comparable

<sup>25</sup> A. ANASTASI, *PSYCHOLOGICAL TESTING*, 554 (1982).

<sup>26</sup> G.E.A. DEVER, *EPIDEMIOLOGY IN HEALTH SERVICES MANAGEMENT*, 71 (Aspen Systems Corporation 1984); GREEN, *supra* note 5.

assessment tool — that is valid and reliable — does exist, using this instrument rather than constructing a new one can have several advantages such as savings in time and resources and make possible comparative and cumulative research.

Once an assessment tool has been selected or designed, it should then be pilot-tested to the target individual/population prior to its administration. For instance, if a behavioral risk management program is meant to change a person's attitude toward a recommended health action, the Health Perceptions Questionnaire might be selected to measure changes in the attitudinal variable.<sup>27</sup>

- *Step D. List the variables determined to be important.* This step simply involves listing — in the fourth column of the matrix — the variables that can be measured and that are believed to be important. These variables are determined on the basis of the cut-points ascribed to the assessment instruments described above.

- *Step E. Assign an importance rating to the variables (optional).* If an excessive number of factors are identified as important and available fiscal, temporal and human resources do not permit the intended behavioral risk management program to address all relevant factors (this is probably the rule rather than the exception), some decisions will need to be made about which indicators are most important to address. Therefore, the fifth column of the BIPG matrix directs the intervenor to prioritize the indicators. This column is subdivided into three levels of importance ratings. These are: L for low importance, M for moderate importance and H for high importance. These “importance” judgments (priority ratings) could be made on considerations of such criteria as feasibility, relative importance of behavioral and non-behavioral factors, compliance and potential effectiveness.

- *Step F. Select or design intervention components that address the variables.* Selecting or designing intervention components that address the variables considered to be important determinants of health-impairing behavior basically involves matching intervention modules with needs that have been identified through the application of the BIPG

<sup>27</sup> Goodwin et al., *supra* note 23.



process (column 6). For example, if the inability to resist peer pressure is identified as an important factor, peer-pressure resistance techniques, including social role modeling, could be used to instruct individuals on how to manage difficult situations through imitation of others who model the target behavior. Once the intervention components have been determined, they should be integrated into a package of related activities tailored to the target population, i.e., culturally competent, developmentally appropriate and linguistically specific.<sup>28</sup>

### *Phase 3*

Phase 3 is the implementation and evaluation phase of the BIPG. The purpose of this phase is to determine if the intervention had the desired impact on the target population. It comprises the steps of: (A) assessing *a priori* the viability of the program with a pilot study or formative evaluation, (B) implementing the most viable program, (C) engaging in activity, effectiveness and economic evaluation research to document the quality, effects and relative economic benefits of the prevention program activities and (D) feedback results to inform refinement of the intervention and contribute to the behavioral science base in general.

The evaluation, whether it is conducted before or after the program is widely implemented, should be based on the strategies used to develop the behavioral program and address issues such as: behavior change, cost-effectiveness, cost-benefit, coverage analysis (distribution and accessibility) and legal and ethical issues.<sup>29</sup>

• *Step A. Assess a priori the viability of the program with formative evaluation research.* Before the behavioral risk management program is widely implemented, it is important to “pilot” test the complete intervention program or specific program components. This type of assessment which is carried out in the developmental or formative stages of a program, along with the information derived from assessing the

<sup>28</sup> R.O. VALDISERRI, PREVENTING AIDS: THE DESIGN OF EFFECTIVE PROGRAMS (1989).

<sup>29</sup> Centers for Disease Control, *A Framework for Assessing the Effectiveness of Disease and Injury Prevention*, 41(RR-3) M.M.W.R. RECOMMENDATIONS AND REPORTS (1992).

health needs and determinants of the priority group (see Phase 1), is commonly referred to as formative evaluation. As with evaluations conducted during the operational stage of the program (after the program is fully implemented), formative evaluation can involve activity, effectiveness and economic assessments. The purposes of these different types of evaluation are discussed under Step C below.

Formative evaluation allows program administrators to implement changes incrementally and evaluate them prior to full-scale commitment of resources. If limited resources are an issue, one should give priority to pretesting materials that are mass-produced, messages that have controversial overtones and important take-home messages.<sup>30</sup>

- *Step B. Implement the most viable program.* Once the formative evaluation has been completed and the intervention has been crafted to identified needs of the target population — on the basis of what was learned from formative assessments — the behavioral risk management program may be implemented on a larger scale. An implementation plan should be formulated and used to ensure that the program is executed systematically.

- *Step C. Engage in activity, effectiveness and resource-benefit evaluation research to establish the effectiveness of the behavior change program.* Although a program may have been found effectual in its developmental on the basis of a formative evaluation, this does not guarantee that it will achieve the desired effect when implemented on a broad scale. Therefore, further evaluative effort is necessary during the full-scale operational stage of the prevention program. Again, this may entail activity, outcome and economic assessments.

The purposes of the activity evaluation are to collect information that will help facilitate the replication of the program activity in other settings and provide data that can be useful in modifying the service components, if necessary, in order to increase their effectiveness and efficiency. More specifically, activity evaluation involves tracking the program to learn who is being served and how, when and where.

<sup>30</sup> C.K. Atkin & V. Freimuth, *Formative Evaluation Research in Campaign Design* in PUBLIC COMMUNICATION CAMPAIGNS, 131 (R.E. Rice & C.K. Atkin eds. 1989); SMITH, *supra* note 15.

Effectiveness evaluation examines the short, medium and long-term effects of the intervention. It is important to include relatively sensitive effectiveness measures. One possibility is to apply the Stages of Behavior Change model<sup>31</sup> to the situation at hand. Thereby, even if the client does not fully adopt the desired behaviors, the evaluator can determine if cognitive and initial behavioral progress was made in the direction of achieving the desired behaviors.

Economic evaluation refers to, at least, determining the cost of the behavioral risk management program. Often, this type of evaluation is taken one step further and some form of comparison of the costs and benefits of the program is made.<sup>32</sup>

• *Step D. Feedback results to inform refinement of the intervention and contribute to behavioral science base in general.* Finally, the information learned from the evaluative efforts must be fed back into the program. If the program was partially or totally unsuccessful, a thorough evaluation will provide information about changes that should be made. If the program was completely successful in achieving the stated objectives, then there is good reason to try to expand the behavioral risk management program to other client/audience groups and to other settings. However, this expansion is not guaranteed to succeed; these expanded efforts must also be thoroughly evaluated.

### Example

For purposes of illustrating how the BIPG process can be used to facilitate the development of a tailored behavioral intervention, consider the example of HIV counseling and testing (CT) services provided in drug treatment centers. In these settings the client is asked to participate in HIV CT. To achieve this acceptance of HIV CT, a behavioral risk management program might be developed in the following phases.

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<sup>31</sup> E.A. McConaughy, J.O. Prochaska & W.F. Velicer, *Stages of Change in Psychotherapy: Measurement and Sample Profiles*, 20 *PSYCHOTHERAPY: THEORY RESH. PRAC.* 368 (1983).

<sup>32</sup> S.R. Engleman & J.F. Forbes, *Economic Aspects of Health Education*, 22 *SOC. SCI. MED.* 443 (1986).

*Phase I: Establishing the Program Purpose*

• *Step A. Formulate the health objective.* The health objectives of providing HIV CT to clients in a drug treatment center vary according to serostatus. For seropositives, the objectives are to prevent disease transmission, increase longevity and quality of life. Whereas, for seronegatives, the goal is to increase awareness of steps that can be taken to avoid risks of infection.

In the current example the causal chain in achieving the health objective is as follows: a) acceptance of HIV CT; b) engaging in CT; c) changing high risk behavior as a result of CT; and d) actually reducing risk of HIV infection or transmission. Development of the behavioral risk management program illustrated here begins at the first step in this causal chain. Therefore, the objective for this example can be formally stated as follows: “To <increase> <acceptance of HIV counseling and testing by 50% in individuals identified at high risk in a target drug treatment center> <within one year>.”

• *Step B. Determine if behavior is important in achieving objectives.* There is a documented (empirical) relationship between sharing of needles and the transmission of HIV. The epidemiologic evidence that supports this relationship includes: (1) the strength of the association (relative risk) — the excess risk (likelihood) of being HIV positive among individuals who inject drugs and share needles as compared with individuals who do neither, (2) the dose-response relationship (gradient effect) — the greater the number of years of injection drug use with sharing of needles, the more likely a person is to be infected with HIV, (3) consistency (repeatability) — the same high risk behaviors and etiological agent have been documented, not only in the U.S., but elsewhere, (4) temporally correct — the practice of risky behaviors precedes infection and the onset of AIDS symptoms, (5) specificity — although there can be overlap between risky behaviors, e.g. injection drug use and having sex with multiple partners, there is adequate evidence to indicate that a single risky behavior can account for HIV infection and (6) biological plausibility (logical) — HIV infection has been associated with certain behavioral practices exclusively and is not transmitted by a mosquito bite or casual contact. If the association

can be established based on these criteria, the behavior in question is considered a risk factor for the target disease. Therefore, in the present example, modifying behavior(s) that decrease the likelihood of HIV/AIDS acquisition or transmission should become the programmatic objective. HIV CT is one strategy for achieving this behavior modification and client acceptance of HIV CT is the first step in service delivery. Other advantages of HIV counseling and testing programs include: (1) protection of the blood supply, (2) provision of referral services for seropositives and seronegatives that continue to be at risk and (3) partner notification of seropositives.<sup>33</sup>

- *Step C. Determine whether a behavior change program should be undertaken.* In this example, because the health objectives are important to achieve, a behavior risk management program is warranted. This assumes that fiscal and human resources are available to develop and execute the program.

- *Step D. Determine the client's decision to be targeted.* Here, the client is deciding whether or not to accept HIV CT.

- *Step E. Determine the communication strategy to be used.*

*Informational.* The goal of an informational communication strategy, as it applies here, is to convey information about HIV CT and its availability in an accurate, comprehensible and comprehensive manner. Using this information, clients will choose whether to accept HIV counseling and testing and the counselor will act according to the client's decision. This approach assumes that a patient's values are known and the counselor only needs to provide the facts.<sup>34</sup>

*Persuasion.* If a persuasion communication strategy is applied, the goal would be to get the client to accept HIV CT providing information as above, with the idea that the client should be convinced that the benefits of HIV CT outweigh any "costs." If the client does not accept, increasingly intensive efforts to persuade, such as incentives, should be continued until the client has agreed to the intervention. If the client is not persuaded, this approach has failed.<sup>35</sup>

<sup>33</sup> D.L. Higgins et al., *Evidence for the Effects of HIV Antibody Counseling and Testing on Risk Behaviors*, 266 J. A.M.A. 2419 (1991).

<sup>34</sup> Emanuel, *supra* note 20.

*Decision-Making Partnership.* The goal is to help the client consider perceived costs and benefits carefully prior to making a decision about whether or not to accept HIV CT. The way to achieve this goal is to provide information as in the informational model described above, in addition to accurately portraying commonly-acknowledged benefits and costs of HIV CT, fostering encouragement of client's consideration of perceived benefits and costs and providing support to clients as they decide about accepting CT. The counselor interprets clients' values and clarifies what they actually want before making the best informed decision. It is a "joint process of understanding" where, ultimately, clients determine their course of action.<sup>36</sup> In terms of Prochaska's Theory of Stages of Behavior Change, this refers to moving from the contemplative to the ready-for-action stage.<sup>37</sup>

Here, a Persuasive Communication model was chosen on the basis of Hochbaum's recommendation, advanced as a decision rule earlier in this paper, concerning how to decide when societal rights take precedence over individual rights. We chose this method because HIV is serious, the surrounding community is susceptible and all available ethical means should be used in convincing clients to act to reduce the likelihood of acquiring or transmitting the virus.

### *Phase 2: Applying The Matrix*

- *Steps A & B. Specify host (internal) and environmental (external) conceptual factors.*

Specify essential variables and attributes of each factor deemed to be important in explaining the behavior.

Once the purpose of the program and the decision concerning whether or not to accept counseling have been established, specify factors and variables that are conceivable determinants of health-impairing personal behaviors by filling in the BIPG matrix.

<sup>35</sup> Covello, *supra* note 20; Emanuel *supra* note 20; Hochbaum, *supra* note 21; McGuire, *supra* note 20; National Research Council, *supra* note 20.

<sup>36</sup> Emanuel, *supra* note 20.

<sup>37</sup> McConaughy, *supra* note 31; J.O. PROCHASKA & C.C. DICLEMENTE, *THE TRANS-THEORETICAL APPROACH: CROSSING TRADITIONAL BOUNDARIES OF THEORY* (1984).

The variables for this example within the internal factor of Attitudes, Beliefs and Core Values<sup>38</sup> are, at least, perceived personal vulnerability and seriousness of the threat, perceived efficacy of recommended health action (outcome expectations), perceived self-efficacy, perceived support of significant others regarding behavioral change, behavioral intentions, readiness to change and the value a person places on health relative to other considerations. These variables were derived from the findings reported in an publication.<sup>39</sup> Certainly other factors are relevant, but we will not elaborate further due to space constraints.

- *Steps C & D. Select or design a composite of measurement indicators (assessment tool) that correspond with each of the factors.*

List the variables determined to be important.

After the factors and variables have been listed, the next step is to select or design measurement indicators or assessment tools to determine the variables' importance in changing behaviors. In this example, a questionnaire could be designed to assess knowledge of HIV/AIDS and the health risks associated with becoming infected. This type of questionnaire should present individuals with particular situations where decisions must be made based on current knowledge.

One example of a questionnaire that is already developed to assess perceived personal vulnerability and seriousness of the threat is the Health Perceptions Questionnaire.<sup>40</sup> This questionnaire is based on the Theory of Reasoned Action<sup>41</sup> and evaluates the individual's beliefs and perceptions in an attempt to predict behavior and behavioral intentions.

For the purposes of this illustrative example, we will argue that all of these variables are measurable and important.

- *Step E. Assign an importance rating to the variables (optional).*

For purposes of simplifying the example, the assumption is made that there are sufficient financial and human resources to address the factors and variables in Steps A and B.

<sup>38</sup> See the figures at the end of the paper.

<sup>39</sup> CENTERS FOR DISEASE CONTROL, NCPS AIDS COMMUNITY DEMONSTRATION PROJECTS: WHAT WE HAVE LEARNED 1985-1990, 3 (1992).

<sup>40</sup> Goodwin, *supra* note 27.

<sup>41</sup> Fishbein, *supra* note 6.

• *Step F. Select or design intervention components to address the variables.* After completing the BIPG process, the resulting behavioral risk management program will provide an “enhanced” intervention (in this case, an enhanced invitation to engage in HIV counseling and testing). An “enhanced” intervention would notify the client that HIV CT will include not only information about STD/HIV, but also discussions about behavioral risk reduction. These CT activities are related to the variables of perception within the internal factor of Attitudes, Beliefs and Core Values determined in Phase 2, Steps A through D and assist the client in proceeding through the stages of behavior change as described by Prochaska: precontemplation (unaware of or disregarding a problem), contemplation (thinking about the problem), ready for action, action and maintenance.<sup>42</sup> In this example, the Stages of Behavior Change model is being applied to the following behavior: actual acceptance of HIV CT.

### *Phase 3*

#### *Example of Implementing and Evaluating the Program*

An evaluation plan must include the steps below to determine if the intervention had the desired impact on the target population.

• *Step A. Assess a priori the viability of the program with formative evaluation research.* As a part of the formative evaluation, it would be appropriate to pretest the sample messages and/or interventions on a small sample of the target audience with a questionnaire to elicit initial reactions. Focus group methodology also could be used in this example.

• *Step B. Implement the most viable program.* Implementation of the program is the actual use of the enhanced approach for encouraging clients to accept HIV CT.

• *Step C. Engage in activity, effectiveness and economic evaluation research to establish the effectiveness of the prevention program.* Examples of evaluative techniques may be helpful. Activity evaluation, in this case, should track the number of clients receiving the enhanced invitation to HIV CT, the number of counselors on the project, the amount of materials (such as notepads) used and descriptions of how planned approaches differed from the actual implementation.

<sup>42</sup> McConaughy, *supra* note 31; Prochaska, *supra* note 37.



One possible effectiveness evaluation is a study in which clients are randomized to receive either the enhanced invitation or the standard invitation to HIV CT. In this way, one could make some assessment as to whether those clients receiving the enhanced invitation were more likely to accept HIV CT than those who did not.

Any economic evaluation would include a quantification of the economic cost of the program. Comparison of the costs and benefits of this program might involve a cost-effectiveness analysis in which the evaluator attempts to answer the question, "What is the additional cost to the program for each additional client who accepts HIV CT?"

- *Step D. Feedback results to inform refinement of the intervention and contribute to behavioral science base in general.* The step entails comparing the objectives outlined in Phase 1 with the results of the evaluation phase to determine if the objectives have been met. This step will be useful in adjusting your behavior change program with more realistic objectives, if needed and it will also provide information about adjustments that need to be made in delivering the HIV/AIDS intervention, e.g., improve the training of counselors to make them more sensitive to the social concerns of clients.

### **Summary**

The realization that nine of the ten leading causes of death have behavioral components (determinants) has prompted public health leaders to employ behavioral scientists to develop and evaluate behavioral risk management programs. Approaches to developing these programs have varied considerably. The most common bona fide approaches to developing behavioral risk management programs have either depended on a structured paradigm to guide the development process or followed a trans-theoretical approach which encourages intervenors to choose among the most salient factors or features of the various behavior change paradigms in the process of intervention development. Both of the structured paradigm and the trans-theoretical approaches have shortcomings. Although relying on a behavioral paradigm (e.g., Health Beliefs Model) to provide a structured approach

to intervention development, the structure is inflexible and thereby can become self-defeating in the face of advancing behavioral technology. Conversely, the problem with the “strictly” trans-theoretical approach is the loss of structure provided by the paradigm. Hence, the trade-off for increased flexibility is the loss of structure. To address these problems while attempting to benefit from the advantages of both the behavioral paradigm and the trans-theoretical approaches to intervention development, we have conceived the trans-theoretical BIPG. It is a matrix-structured framework that can be used to help develop theory-based, systematic risk management programs to address factors relevant to changing health-endangering behaviors. Its principle advantage lies in combining the flexibility of a trans-theoretical approach with the structure of a paradigm. Intervenors are not restricted to one behavioral model but can encompass the stated principles of several models in an attempt to be thorough and comprehensive. Also, if no existing theory or combination of theories provides a useful basis for a particular application, the BIPG process assists in constructing novel theories.

The BIPG also incorporates an interdisciplinary approach to intervention development. Policy makers, program administrators and behavioral scientists are required to carry out the steps in Phase 1; whereas the steps in Phase 2 require training in behavioral sciences. Finally, Phase 3 should involve program managers in assessing the viability *a priori* and the effectiveness *a posteriori* of the prevention program. Behavioral scientists should also contribute to Phase 3 by assisting in evaluation.

Anyone who has attempted or completed the development of a behavioral health-risk management program will appreciate that it is a daunting task. We hope that this paper has provided at least a starting point for the systematic development of such programs.

### Appendix

The following figures show the BIPG matrix framework for evaluating internal and external factors.

Internal Factors as conceivable determinants of the health-impairing behavior to be changed	Essential variables and attributes	Measurement Indicators & Assessment Tools	Variables determined to be <i>important</i> , based on assessment	Importance Ratings (Optional)			Behavior Interventions to address important variables
				L	M	H	
Knowledge	<ul style="list-style-type: none"> <li>• Health risk/disease?</li> <li>• Steps to desired actions?</li> <li>• Benefits of action?</li> </ul>						
Attitudes, Beliefs and Core Values (ABCs)	<ul style="list-style-type: none"> <li>• Perceived seriousness of threat?</li> <li>• Perceived efficacy of recommended action?</li> <li>• Perceived acceptability of recommended action?</li> <li>• Value of others' approval?</li> <li>• Belief about the behavior?</li> <li>• Readiness to change?</li> <li>• Behavioral intentions?</li> <li>• Extent of self-sufficiency?</li> <li>• Self-standards?</li> </ul>						
Life Adaptation Skills	<ul style="list-style-type: none"> <li>• Knowledge, skills and dispositions needed to function socially?</li> </ul>						
Psychological Disposition	<ul style="list-style-type: none"> <li>• Anxiety?</li> <li>• Depression?</li> <li>• Self-esteem?</li> <li>• Assertiveness?</li> <li>• Motivation?</li> </ul>						
Physiology	<ul style="list-style-type: none"> <li>• Immune status?</li> <li>• Energy level?</li> <li>• Appearance?</li> <li>• Motor Skills?</li> </ul>						

External Factors as conceivable determinants of the health-impairing behavior to be changed	Essential variables and attributes	Measurement Indicators & Assessment Tools	Variables determined to be important, based on assessment	Importance Ratings (Optional)			Behavior interventions to address important variables
				L	M	H	
Social Support	<ul style="list-style-type: none"> <li>• Support from family?</li> <li>• Support from friends?</li> <li>• Support from institutions?</li> </ul>						
Media	<ul style="list-style-type: none"> <li>• Television?</li> <li>• Radio?</li> <li>• Newspapers?</li> </ul>						
Socio-cultural, economic and political	<ul style="list-style-type: none"> <li>• Social norms?</li> <li>• Socioeconomic status?</li> <li>• Political atmosphere?</li> </ul>						
Biologic	<ul style="list-style-type: none"> <li>• Exposure to plants, animals, etc.?</li> <li>• Provision for adequate functioning?</li> </ul>						
Health Care System	<ul style="list-style-type: none"> <li>• Acceptable?</li> <li>• Available?</li> <li>• Accessible?</li> </ul>						
Environmental Stressors	<ul style="list-style-type: none"> <li>• Familial, educational &amp; occupational climate?</li> <li>• Adequate socialization?</li> <li>• Provisions for maintaining order?</li> </ul>						
Societal Laws and Regulations	<ul style="list-style-type: none"> <li>• EPA?</li> <li>• Drinking &amp; driving laws?</li> </ul>						
Others	<ul style="list-style-type: none"> <li>• Pleasure from behavior?</li> <li>• Effort Required?</li> <li>• Experience with recommended action?</li> </ul>						

