

Tables and Figure for

## A Taxonomy of Behavior Change Methods; an Intervention Mapping Approach

This document contains the Tables and Figure that accompany the publication “A Taxonomy of Behavior Change Methods; an Intervention Mapping Approach” that was accepted for publication (and published online) in *Health Psychology Review* in 2015:

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Note that the final citation will likely be different (e.g. the article may be published in 2016 or later), but the DOI will remain the same.

This document is available as supplemental material accompanying the publication in *Health Psychology Review* (<http://dx.doi.org/10.1080/17437199.2015.1077155>), and in the Open Science Framework repository at <http://osf.io/sqtuz>. Note that introductory material to this publication and these tables with behavior change methods is available at <http://effectivebehaviorchange.com>.

If you wish to cite these supplemental materials, instead please cite the original paper to which they belong (see <http://dx.doi.org/10.1080/17437199.2015.1077155>).

This document contains four sections: first, the abstract of the original *Health Psychology Review* publication; second, an excerpt from that publication where use of the tables is explained; third, Tables 1-15 and Figure 1 from the publication; and fourth, the references cited in Tables 1-15.

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## Abstract

In this paper, we introduce the IM taxonomy of behavior change methods and its potential to be developed into a coding taxonomy. That is, although IM and its taxonomy of behavior change methods are not in fact new, because IM was originally developed as a tool for intervention development, this potential was not immediately apparent. Second, in explaining the IM taxonomy and defining the relevant constructs, we call attention to the existence of parameters for effectiveness of methods, and explicate the related distinction between theory-based methods and practical applications and the probability that poor translation of methods may lead to erroneous conclusions as to method-effectiveness. Third, we recommend a minimal set of intervention characteristics that may be reported when intervention descriptions and evaluations are published. Specifying these characteristics can greatly enhance the quality of our meta-analyses and other literature syntheses.

In conclusion, the dynamics of behavior change are such that any taxonomy of methods of behavior change needs to acknowledge the importance of, and provide instruments for dealing with, three conditions for effectiveness for behavior change methods. For a behavior change method to be effective: 1) it must target a determinant that predicts behavior; 2) it must be able to change that determinant; 3) it must be translated into a practical application in a way that preserves the parameters for effectiveness and fits with the target population, culture, and context. Thus, taxonomies of methods of behavior change must distinguish the specific determinants that are targeted, practical, specific applications, and the theory-based methods they embody. In addition, taxonomies should acknowledge that the lists of behavior change methods will be used by, and should be used by, intervention developers. Ideally, the taxonomy should be readily usable for this goal; but alternatively, it should be clear how the information in the taxonomy can be used in practice. The IM taxonomy satisfies these requirements, and it would be beneficial if other taxonomies would be extended to also meet these needs.

The following is an excerpt from the original open access paper in Health Psychology Review (<http://dx.doi.org/10.1080/17437199.2015.1077155>). If you have not yet read that paper, we strongly recommend doing so first to provide the necessary background for understanding these tables. Two introductory open access articles, “A practical guide to effective behavior change: How to identify what to change in the first place” and “A practical guide to effective behavior change: How to apply theory- and evidence-based behavior change methods in an intervention” are available at <http://effectivebehaviorchange.com>, and can also be of help.

## How to use the tables

This description assumes that the intervention developer has identified which behavior to change, and whose behavior this is (i.e., either of a target population individual or of an environmental agent). It also assumes that the relevant determinants and underlying beliefs have been identified. When selecting methods for individuals from the target population, for each determinant, Tables 1-8 can be consulted to get an initial list of methods that can be used to change that determinant. For example, Table 1 contains methods that can be used for most determinants, whereas Table 3 contains methods to change awareness and risk perception, and Table 6 contains methods to change perceived social influence. For each potential method, inspect the definition and the parameters to determine whether the method is applicable given the situation. Then, use the references included in the Tables to study the relevant literature, and use bibliographic databases such as Google Scholar to locate more recent literature. Repeat these steps for all determinants, until methods have been identified to target all determinants and beliefs. Then, translate these methods into practical applications, making sure that the parameters for effectiveness are respected. It is important to note that these parameters for effectiveness are subject to change as new literature is published. Also, the strength of the evidence for each method varies, new methods can emerge, and evidence can accumulate that certain methods are better avoided (e.g., threatening communication in populations low in self-efficacy).

When selecting methods to target environmental agents, the process is similar. Depending on the environmental level of the agent, consult Tables 9-14 to get an initial list of methods. For example, Table 9 contains basic methods that can be used for agents at all environmental levels, whereas Table 11 contains methods that can be used to target agents at the organizational level. Because each environmental agent is a person (or several), in addition to these environmental methods, Tables 1-8 can also be consulted to get a list of methods at the individual level. Of course, at the environmental level, it is also necessary to consult the literature, both those publications cited in the tables and recent updates.

Nota bene: The theoretical background for all methods is provided in Bartholomew et al. (2011; 2016) and mentioned in the tables. Use the Bartholomew et al. book to find the essential background information.

## Tables and Figure

Table 1: Basic Methods at the Individual Level (Adapted from Bartholomew et al., 2011)

Method (related theories and references)	Definition	Parameters
<b>Participation</b> (Diffusion of Innovations Theory; Theories of Power; Organizational Development Theories; Models of Community Organization; Cummings & Worley, 2015; McCullum, Pelletier, Barr, Wilkins, & Habicht, 2004; Rogers, 2003; World Health Organization Regional Office for Europe, 2002)	Assuring high level engagement of the participants' group in problem solving, decision making, and change activities; with highest level being control by the participants' group.	Requires willingness by the health promoter or convener to accept the participants as having a high level of influence; Requires participants' group to possess appropriate motivation and skills.
<b>Belief selection</b> (Theory of Planned Behavior; Reasoned Action Approach; Fishbein & Ajzen, 2010)	Using messages designed to strengthen positive beliefs, weaken negative beliefs, and introduce new beliefs.	Requires investigation of the current attitudinal, normative and efficacy beliefs of the individual before choosing the beliefs on which to intervene.
<b>Persuasive communication</b> (Communication-Persuasion Matrix; Elaboration Likelihood Model; Diffusion of Innovations Theory; McGuire, 2012; Petty, Barden, & Wheeler, 2009; Rogers, 2003)	Guiding individuals and environmental agents toward the adoption of an idea, attitude, or action by using arguments or other means.	Messages need to be relevant and not too discrepant from the beliefs of the individual; can be stimulated by surprise and repetition. Will include arguments.
<b>Active learning</b> ((Elaboration Likelihood Model; Social Cognitive Theory; Kelder, Hoelscher, & Perry, 2015; Petty et al., 2009)	Encouraging learning from goal-driven and activity-based experience.	Time, information, and skills.
<b>Tailoring</b> (Trans-Theoretical Model; Precaution Adoption Process Model; Protection Motivation Theory; Communication-Persuasion Matrix; Lustria, Cortese, Noar, & Glueckauf, 2009; McGuire, 2012; Weinstein, Sandman, & Blalock, 2008; Werrij, Ruiters, van 't Riet, & de Vries, 2012)	Matching the intervention or components to previously measured characteristics of the participant.	Tailoring variables or factors related to behavior change (such as stage) or to relevance (such as culture or socioeconomic status).
<b>Individualization</b> (L K Bartholomew et al., 2000; L. K. Bartholomew, Czyzewski, Swank, McCormick, & Parcel, 2000; Prochaska, Redding, & Evers, 2015)	Providing opportunities for learners to have personal questions answered or instructions paced according to their individual progress.	Personal communication that responds to a learner's needs.
<b>Modeling</b> (Social Cognitive Theory; Theories of Learning; Kazdin, 2008; Kelder et al., 2015)	Providing an appropriate model being reinforced for the desired action.	Attention, remembrance, self-efficacy and skills, reinforcement of model; identification with model, coping model instead of mastery model.
<b>Feedback</b> (Theories of Learning; Goal-Setting Theory, Social Cognitive Theory; Kazdin, 2008; Kelder et al., 2015; Latham & Locke,	Giving information to individuals and environmental agents regarding the extent to which they are accomplishing learning or	Feedback needs to be individual, follow the behavior in time, and be specific.

2007)	performance, or the extent to which performance is having an impact.	
<b>Reinforcement</b> (Theories of Learning; Social Cognitive Theory; Kazdin, 2008; Kelder et al., 2015; McSweeney & Murphy, 2014)	Providing reinforcement: linking a behavior to any consequence that increases the behavior's rate, frequency or probability.	Reinforcement need to be tailored to the individual, group, or organization, to follow the behavior in time, and to be seen as a consequence of the behavior.
<b>Punishment</b> (Theories of Learning; Kazdin, 2008; McSweeney & Murphy, 2014)	Providing punishment: linking a behavior to any consequence that decreases the behavior's rate, frequency or probability.	Punishment need to be tailored to the individual, group, or organization, to follow the behavior in time, and to be seen as a consequence of the behavior. Punishment should be avoided because of negative side effects. If used, emphasis should be on positive reinforcement.
<b>Motivational interviewing, MI</b> (Self-determination theory; Theories of self-regulation; Miller & Rollnick, 2012; Ng et al., 2012; Ryan & Deci, 2000)	Providing a collaborative, goal-oriented style of communication with particular attention to the language of change; designed to strengthen personal motivation for and commitment to a specific goal by eliciting and exploring the person's own reasons for change within an atmosphere of acceptance and compassion.	A supportive relationship between client and professional combined with the evocation of patient change talk. Professionals must recognize that MI involves collaboration not confrontation, evocation not education, autonomy rather than authority, and exploration instead of explanation.
<b>Facilitation</b> (Social Cognitive Theory; Bandura, 1986)	Creating an environment that makes the action easier or reduces barriers to action.	Requires real changes in the environment instead of in the perceptions of the environment. Requires the identification of barriers and facilitators and the power for making the appropriate changes. Facilitating conditions on one environmental level are usually dealt with by intervening on a higher environmental level.
<b>Nudging</b> (Theories of Automatic, Impulsive and Habitual Behavior; de Ridder, 2014; Thaler & Sunstein, 2008)	Simple changes in the presentation of choice alternatives that make the desired choice the easy, automatic or default choice.	Requires autonomy: freedom of choice, a sense of awareness, and the healthy choice being default: easy and attractive.

Table 2: Methods to Increase Knowledge (Adapted from Bartholomew et al., 2011)

Method (related theories and references)	Definition	Parameters
<b>Chunking</b> (Theories of Information Processing; Gobet et al., 2001; Smith, 2008)	Using stimulus patterns that may be made up of parts but that one perceives as a whole.	Labels or acronyms are assigned to material to aid memory.
<b>Advance organizers</b> (Theories of Information Processing; Kools, van de Wiel, Ruiter, Crüts, & Kok, 2006; Kools, 2011)	Presenting an overview of the material that enables a learner to activate relevant schemas so that new material can be associated.	Schematic representations of the content or guides to what is to be learned.
<b>Using imagery</b> (Theories of Information Processing; Steen, 2007; Wright, 2011)	Using artifacts that have a similar appearance to some subject.	Familiar physical or verbal images as analogies to a less familiar process.
<b>Discussion</b> (Theories of Information Processing; Petty et al., 2009)	Encouraging consideration of a topic in open informal debate.	Listening to the learner to ensure that the correct schemas are activated.
<b>Elaboration</b> (Petty et al., 2009; Theories of Information Processing; Smith, 2008)	Stimulating the learner to add meaning to the information that is processed.	Individuals with high motivation and high cognitive ability; messages that are personally relevant, surprising, repeated, self-pacing, not distracting, easily understandable, and include direct instructions; messages that are not too discrepant and cause anticipation of interaction.
<b>Providing cues</b> (Theories of Information Processing; Godden & Baddeley, 1975)	Assuring that the same cues are present at the time of learning and the time of retrieval.	Cues work best when people are allowed to select and provide their own cues.

Table 3: Methods to Change Awareness and Risk Perception (Adapted from Bartholomew et al., 2011)

Method (related theories and references)	Definition	Parameters
<b>Consciousness raising</b> (Health Belief Model; Precaution-Adoption Process Model; Trans-Theoretical Model; Prochaska et al., 2015; Skinner, Tiro, & Champion, 2015; Weinstein et al., 2008)	Providing information, feedback, or confrontation about the causes, consequences, and alternatives for a problem or a problem behavior.	Can use feedback and confrontation; however, raising awareness must be quickly followed by increase in problem-solving ability and (collective) self-efficacy.
<b>Personalize risk</b> (Precaution-Adoption Process Model; Skinner et al., 2015)	Providing information about personal costs or risks of action or inaction with respect to target behavior.	Present messages as individual and undeniable, and compare them with absolute and normative standards.
<b>Scenario-based risk information</b> (Precaution-Adoption Process Model; Mevissen, Meertens, Ruiters, Feenstra, & Schaalma, 2009)	Providing information that may aid the construction of an image of the ways in which a future loss or accident might occur.	Plausible scenario with a cause and an outcome; imagery. Most effective when people generate their own scenario or when multiple scenarios are provided.
<b>Framing</b> (: Van 't Riet et al., 2014; Werrij et al., 2010) (Protection Motivation Theory; Van 't Riet et al., 2014; Werrij et al., 2012)	Using gain-framed messages emphasizing the advantages of performing the healthy behavior; or loss-framed messages, emphasizing the disadvantages of not performing the healthy behavior.	Requires high self-efficacy expectations. Gain frames are more readily accepted and prevent defensive reactions.
<b>Self-reevaluation</b> (Trans-Theoretical Model; Prochaska et al., 2015)	Encouraging combining both cognitive and affective assessments of one's self-image with and without an unhealthy behavior.	Stimulation of both cognitive and affective appraisal of self-image. Can use feedback and confrontation; however, raising awareness must be quickly followed by increase in problem-solving ability and self-efficacy.
<b>Dramatic relief</b> (Trans-Theoretical Model; Prochaska et al., 2015)	Encouraging emotional experiences, followed by reduced affect or anticipated relief if appropriate action is taken	Preferably should be done in counseling context so that emotions can be aroused and subsequently relieved.
<b>Environmental reevaluation</b> (Trans-Theoretical Model; Prochaska et al., 2015)	Encouraging combining the affective and cognitive assessments of how the presence or absence of a personal behavior affects one's social environment.	May include awareness about serving as a role model for others.
<b>Fear arousal</b> (Protection Motivation Theory; Extended Parallel Process Model; Peters, Ruiters, & Kok, 2013; Ruiters, Kessels, Peters, & Kok, 2014)	Arousing negative emotional reactions in order to promote self-protective motivation and action.	Requires high self-efficacy expectations rather than high outcome expectations alone; is rarely effective.
<b>Self-affirmation</b> (Self-Affirmation Theory; Cohen & Sherman, 2014)	Increasing people's self-image by having them elaborate on their relevant values or desirable characteristics.	Must be tailored to individual self-image.

Table 4: Methods to Change Habitual, Automatic and Impulsive Behaviors (Adapted from Bartholomew et al., 2011)

<b>Method</b> (related theories and references)	<b>Definition</b>	<b>Parameters</b>
<b>Deconditioning</b> (Theories of Learning; Robbins, Schwartz, & Wasserman, 2001)	Letting people experience a lack of reinforcement or even negative outcomes of the undesired behavior.	Slow process, especially when reinforcement schedule was intermittent. It may be necessary to create a continuous lack of positive reinforcement.
<b>Counterconditioning</b> (Wood & Neal, 2007)	Encouraging the learning of healthier behaviors that can substitute for problem behaviors.	Availability of substitute behaviors.
<b>Implementation intentions</b> (Theories of Goal Directed Behavior; Theories of Automatic, Impulsive and Habitual Behavior; Gollwitzer & Sheeran, 2006; Verplanken & Aarts, 1999)	Prompting making if-then plans that link situational cues with responses that are effective in attaining goals or desired outcomes.	Existing positive intention.
<b>Cue altering</b> (Verplanken & Aarts, 1999; Wood & Neal, 2007)	Teaching people to change a stimulus that elicits or signals a behavior.	Existing positive intention.
<b>Stimulus control</b> (Prochaska et al., 2015; Wood & Neal, 2007)	Encouraging removing cues for unhealthy habits and adding prompts for healthier alternatives.	Needs insight in the behavioral chain leading to the automatic response.
<b>Planning coping responses</b> (Attribution Theory and Relapse Prevention Theory; Theories of Goal Directed Behavior; Hofmann, Friese, & Wiers, 2008; Marlatt & Donovan, 2005)	Getting the person to identify potential barriers and ways to overcome these.	Identification of high-risk situations and practice of coping response.
<b>Early commitment</b> (Theories of Learning; Robbins et al., 2001)	Having people choose a (larger) delayed reward far in advance.	Making the choice may be forced but the choice for the delayed reward needs to be voluntary.
<b>Public commitment</b> (Theories of Automatic, Impulsive and Habitual Behavior; Ajzen, Czausch, & Flood, 2009)	Stimulating pledging, promising or engaging oneself to perform the healthful behavior, and announcing that decision to others.	Most effective when publicly announced; may include contracting.
<b>Training executive function</b> (Theories of Automatic, Impulsive and Habitual Behavior; Diamond, 2013)	Improving the top-down mental control processes that are used when going on automatic or relying on instinct or intuition would be ill-advised, insufficient, or impossible.	The task has to be challenging and substantial repetition is required to sufficiently train the executive functions.

Table 5: Methods to Change Attitudes, Beliefs, and Outcome Expectations (Adapted from Bartholomew et al., 2011)

<b>Method</b> (related theories and references)	<b>Definition</b>	<b>Parameters</b>
<b>Classical conditioning</b> (Theories of Learning; Kazdin, 2008)	Stimulating the learning of an association between an unconditioned stimulus (UCS) and a conditioned stimulus (CS).	Most effective when the time interval is short and the CS precedes the UCS.
<b>Self-reevaluation</b> (Trans-Theoretical Model; Prochaska et al., 2015)	Encouraging combining both cognitive and affective assessments of one's self-image with and without an unhealthy behavior.	Stimulation of both cognitive and affective appraisal of self-image. Can use feedback and confrontation; however, raising awareness must be quickly followed by increase in problem-solving ability and self-efficacy.
<b>Environmental reevaluation</b> (Trans-Theoretical Model; Prochaska et al., 2015)	Encouraging realizing the negative impact of the unhealthy behavior and the positive impact of the healthful behavior.	Stimulation of both cognitive and affective appraisal to improve appraisal and empathy skills.
<b>Shifting perspective</b> (Theories of Stigma and Discrimination; Batson, Chang, Orr, & Rowland, 2002)	Encouraging taking the perspective of the other.	Initiation from the perspective of the learner; needs imaginary competence.
<b>Arguments</b> (Communication-Persuasion Matrix; Elaboration Likelihood Model; McGuire, 2012; Petty & Wegener, 2010)	Using a set of one or more meaningful premises and a conclusion.	For central processing of arguments they need to be new to the message receiver.
<b>Direct experience</b> (Theories of Learning; Maibach & Cotton, 1995)	Encouraging a process whereby knowledge is created through the interpretation of experience.	Rewarding outcomes from the individual's experience with the behavior or assurance that the individual can cope with and reframe negative outcomes.
<b>Elaboration</b> (Theories of Information Processing; Elaboration Likelihood Model; Petty et al., 2009; Smith, 2008)	Stimulating the learner to add meaning to the information that is processed.	Individuals with high motivation and high cognitive ability; messages that are personally relevant, surprising, repeated, self-pacing, not distracting, easily understandable, and include direct instructions; messages that are not too discrepant and cause anticipation of interaction.
<b>Anticipated regret</b> (Theory of Planned Behavior; Reasoned Action Approach; Richard, van der Pligt, & de Vries, 1995)	Stimulating people to focus on their feelings after unintended risky behavior, before any losses actually materialize.	Stimulation of imagery; assumes a positive intention to avoid the risky behavior.
<b>Repeated exposure</b> (Theories of Learning; Zajonc, 2001)	Making a stimulus repeatedly accessible to the individual's sensory receptors.	Neutrality of original attitude.
<b>Cultural similarity</b> (Communication-Persuasion Matrix; Kreuter & McClure, 2004)	Using characteristics of the target group in source, message, and channel.	Using surface characteristics of the target group enhances receptivity. Using social-cultural characteristics leads to a more positive reception of the message.

Table 6: Methods to Change Social Influence (Adapted from Bartholomew et al., 2011)

Method (related theories and references)	Definition	Parameters
<b>Information about others' approval</b> (Theory of Planned Behavior; Reasoned Action Approach; Social Comparison Theory; Forsyth, 2014; Mollen, Ruiter, & Kok, 2010)	Providing information about what others think about the person's behavior and whether others will approve or disapprove of any proposed behavior change.	Positive expectations are available in the environment.
<b>Resistance to social pressure</b> (Theory of Planned Behavior; Reasoned Action Approach; Evans, Getz, & Raines, 1992; Evans, 1984)	Stimulating building skills for resistance to social pressure.	Commitment to earlier intention; relating intended behavior to values; psychological inoculation against pressure.
<b>Shifting focus</b> (Theory of Planned Behavior; Reasoned Action Approach; Fishbein & Ajzen, 2010)	Prompting hiding of the unpopular behavior or shifting attention away from the behavior.	Preferably shift focus to a new reason for performing the behavior.
<b>Mobilizing social support</b> (Diffusion of Innovations Theory; Theories of Social Networks and Social Support; Holt-Lunstad & Uchino, 2015; Valente, 2015)	Prompting communication about behavior change in order to provide instrumental and emotional social support.	Combines caring, trust, openness, and acceptance with support for behavioral change; positive support is available in the environment.
<b>Provide opportunities for social comparison</b> (Social Comparison Theory; Suls, Martin, & Wheeler, 2002)	Facilitating observation of nonexpert others in order to evaluate one's own opinions and performance abilities.	Upward comparison may help setting better goals; downward comparison may help feeling better or more self-efficacious.

Table 7: Methods to Change Skills, Capability, and Self-Efficacy and to Overcome Barriers (Adapted from Bartholomew et al., 2011)

Method (related theories and references)	Definition	Parameters
<b>Guided practice</b> (Social Cognitive Theory; Theories of Self-Regulation; Kelder et al., 2015)	Prompting individuals to rehearse and repeat the behavior various times, discuss the experience, and provide feedback.	Subskill demonstration, instruction, and enactment with Individual feedback; requires supervision by an experienced person; some environmental changes cannot be rehearsed.
<b>Enactive mastery experiences</b> (Social Cognitive Theory; Theories of Self-Regulation; Kelder et al., 2015)	Providing increasingly challenging tasks with feedback to serve as indicators of capability.	Requires willingness to accept feedback.
<b>Verbal persuasion</b> (Social Cognitive Theory; Theories of Self-Regulation; Kelder et al., 2015)	Using messages that suggest that the participant possesses certain capabilities.	Credible source.
<b>Improving physical and emotional states</b> (Theories of Self-Regulation; Kelder et al., 2015)	Prompting interpretation of enhancement or reduction of physiological and affective states, to judge own capabilities.	Must carefully interpret and manage emotional states.
<b>Reattribution training</b> (Attribution Theory and Relapse Prevention Theory; Theories of Self-Regulation; Marlatt & Donovan, 2005)	Helping people reinterpret previous failures in terms of unstable attributions and previous successes in terms of stable attributions.	Requires counseling or bibliotherapy to make unstable and external attributions for failure.
<b>Self-monitoring of behavior</b> (Theories of Self-Regulation; Creer, 2000; Harkin et al., n.d.)	Prompting the person to keep a record of specified behavior(s).	The monitoring must be of the specific behavior (that is, not of a physiological state or health outcome). The data must be interpreted and used. The reward must be reinforcing to the individual.
<b>Provide contingent rewards</b> (Theories of Learning; Theories of Self-Regulation; Bandura, 1986)	Praising, encouraging, or providing material rewards that are explicitly linked to the achievement of specified behaviors.	Rewards need to be tailored to the individual, group or organization, to follow the behavior in time, and to be seen as a consequence of the behavior.
<b>Cue altering</b> (Theories of Automatic, Impulsive, and Habitual Behavior; Theories of Self-Regulation; Achziger, Gollwitzer, & Sheeran, 2008)	Teaching changing a stimulus, either consciously or unconsciously perceived, that elicits or signals a behavior.	Existing positive intention.
<b>Public commitment</b> (Theories of Automatic, Impulsive, and Habitual Behavior; Ajzen et al., 2009)	Stimulating pledging, promising, or engaging oneself to perform the healthful behavior and announcing that decision to others.	Needs to be a public announcement; may include contracting.
<b>Goal setting</b> (Goal-Setting Theory; Theories of Self-Regulation; Latham & Locke, 2007)	Prompting planning what the person will do, including a definition of goal-directed behaviors that result in the target behavior.	Commitment to the goal; goals that are difficult but available within the individual's skill level.
<b>Set graded tasks</b> (Social Cognitive Theory; Theories of Self-Regulation; Kelder et al., 2015)	Setting easy tasks and increase difficulty until target behavior is performed.	The final behavior can be reduced to easier but increasingly difficult sub-behaviors.

**Planning coping responses**

(Attribution Theory and Relapse Prevention Theory; Theories of Self-Regulation; Marlatt & Donovan, 2005)

Prompting participants to list potential barriers and ways to overcome these.

Identification of high-risk situations and practice of coping response.

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Table 8: Methods to Reduce Public Stigma (Adapted from Bartholomew et al., 2011)

Method (related theories and references)	Definition	Parameters
<b>Stereotype-inconsistent information</b> (Theories of Stigma and Discrimination; Bos, Schaalma, & Pryor, 2008)	Providing positive examples from the stigmatized group.	Only effective when there are many different examples. Examples are not too discrepant from original stereotype.
<b>Interpersonal contact</b> (Theories of Stigma and Discrimination; Pettigrew & Tropp, 2006)	Bringing people in contact with members of the stigmatized group.	Requires positive experiences. Most effective when: no status differences; externally sanctioned; intensive contact; common or shared goals.
<b>Empathy training</b> (Theories of Stigma and Discrimination; Batson et al., 2002)	Stimulating people to empathize with another person, i.e., imagine how the other person would feel.	Requires being able and willing to identify with the stigmatized person. Imagine how the other person would feel (this leads to empathy). Do not imagine how you would feel (this leads to both empathy and distress).
<b>Cooperative learning</b> (Theories of Stigma and Discrimination; Aronson, 2011)	Engineering lessons in a way that students must learn from one another.	Requires careful organization of lesson information distribution.
<b>Conscious regulation of impulsive stereotyping and prejudice</b> (Theories of Stigma and Discrimination; Bos et al., 2008)	Forcing oneself to control impulsive negative reactions related to stigma.	Mere suppression almost always leads to counterproductive effects and is not advisable. Conscious self-regulation of automatic stereotyping can be used effectively.
<b>Reducing inequalities of class, race, gender and sexuality</b> (Theories of Stigma and Discrimination; Link & Phelan, 2001)	<i>See methods for changes at higher Environmental levels (see Tables 9 - 14).</i>	

Table 9: Basic Methods for Change of Environmental Conditions. (Adapted from Bartholomew et al., 2011)

Method (related theories and references)	Definition	Parameters
<b>Systems change</b> (Systems Theory; Best et al., 2012; National Cancer Institute, 2007)	Interacting with the environment to change the elements and relationship among elements of a system at any level, especially through dialogue with stakeholders, action, and learning through feedback.	Methods and actors depend on the level of the system.
<b>Participatory problem solving</b> (Organizational Development Theories; Social Capital Theory; Models of Community Organization; Butterfoss, Kegler, & Francisco, 2008; Cummings & Worley, 2015; Wallerstein, Minkler, Carter-Edwards, Avila, & Sanchez, 2015)	Diagnosing the problem, Generating potential solutions, developing priorities, making an action plan, and obtaining feedback after implementing the plan.	Requires willingness by the health promoter or convener to accept the participants as equals and as having a high level of influence; requires target group to possess appropriate motivation and skills. Will often include goal setting, facilitation, feedback and consciousness raising.
<b>Coercion</b> (Theories of Power; Freudenberg & Tsui, 2014; Turner, 2005)	Attempting to control others against their will.	Requires or creates a power differential.
<b>Advocacy and lobbying</b> (Stage Theory of Organizational Change; Models of Community Organization; Agenda-Building Theory; Multiple Streams Theory; Christoffel, 2000; Galer-Unti, Tappe, & Lachenmayr, 2004; Kingdon, 2003; Wallack, Dorfman, Jernigan, & Themba, 1993; Weible, Sabatier, & McQueen, 2009)	Arguing and mobilizing resources on behalf of a particular change; giving aid to a cause; active support for a cause or position.	Form of advocacy must match style and tactics of the people, communities or organizations represented, and the nature of the issue; includes policy advocacy; often tailored to a specific environmental agent. Will often include persuasive communication, information about others' approval and consciousness raising.
<b>Modeling</b> (Social Cognitive Theory; Organizational Development Theories; Diffusion of Innovations Theory; Empowerment Theory; Bandura, 1997; Kelder et al., 2015; Rogers, 2003)	Providing an appropriate model being reinforced for the desired action.	Appropriate models will vary by level, including group members and organizational, community, and policy change agents.
<b>Technical assistance</b> (Organizational Development Theories, Diffusion of Innovations Theory, Social Capital Theory, Models of Community Organization; Flaspohler, Duffy, Wandersman, Stillman, & Maras, 2008; R. E. Mitchell, Florin, & Stevenson, 2002)	Providing technical means to achieve desired behavior.	Nature of technical assistance will vary by environmental level, but must fit needs, culture, and resources of the recipient.

Table 10: Methods to Change Social Norms (Adapted from Bartholomew et al., 2011)

Method (related theories and references)	Definition	Parameters
<b>Mass media role-modeling</b> (Bandura, 1997; Rogers, 2003)	Providing appropriate models being reinforced for the desired action through the mass media.	Conditions for modeling; conditions for persuasive communication (see Table 1).
<b>Entertainment education</b> (Moyer-Gusé, 2008; Petraglia, 2007; Shen & Han, 2014; Wilkin et al., 2007)	Providing a form of entertainment designed to educate (about health behavior) as well as to entertain.	Consideration of source and channel; balance of media professional's and health promoter's needs.
<b>Behavioral journalism</b> (Diffusion of Innovations Theory; Social Cognitive Theory; Social norm theories; A. L. McAlister, 1991; A. McAlister et al., 2000; Ramirez et al., 2010; Reininger et al., 2010)	Using by the mass and local media of appropriate role-model stories of behavior change based on authentic interviews with the target group.	Adequate role models from the community and elicitation interviews to describe the behavior and the positive outcome.
<b>Mobilizing social networks</b> (Theories of Social Networks and Social Support; Social norm theories; Valente, 2012)	Encouraging social networks to provide informational, emotional, appraisal, and instrumental support.	Availability of social network and potential support givers. Will often include information about others' approval, facilitation and persuasive communication.

Table 11: Methods to Change Social Support and Social Networks (Adapted from Bartholomew et al., 2011)

Method (related theories and references)	Definition	Parameters
<b>Enhancing network linkages</b> (Theories of Social Networks and Social Support; Holt-Lunstad & Uchino, 2015; Valente, 2015)	Training network members to provide support and members of the target group to mobilize and maintain their networks.	Available network.
<b>Developing new social network linkages</b> (Theories of Social Networks and Social Support; Valente, 2015)	Linking members to new networks by mentor programs, buddy systems, and self-help groups.	Willingness of networks to reach out; availability of networks that can provide appropriate support and linkage agents.
<b>Use of lay health workers; peer education</b> (Theories of Social Networks and Social Support; Models of Community Organization; Tolli, 2012)	Mobilizing members of the target population to serve as boundary spanners, credible sources of information, and role models.	Natural helpers in community with opinion leader status and availability to volunteer for training.

Table 12: Methods to Change Organizations (Adapted from Bartholomew et al., 2011)

<b>Method</b> (related theories and references)	<b>Definition</b>	<b>Parameters</b>
<b>Sense-making</b> (Organizational Development Theory; Weick & Quinn, 1999)	Leaders reinterpret and relabel processes in organization, create meaning through dialogue, and model and redirect change.	Used for continuous change, including culture change.
<b>Organizational diagnosis and feedback</b> (Organizational Development Theory; Cummings & Worley, 2015)	Assessing of organizational structures and employees' beliefs and attitudes, desired outcomes and readiness to take action, using surveys and other methods.	Methods appropriate to organizational characteristics, for example, size and information technology. Will often include feedback and consciousness raising.
<b>Team building and human relations training</b> (Organizational Development Theory; Cummings & Worley, 2015)	Grouping development activities based on the values of human potential, participation, and development.	Compatible with the culture.
<b>Structural redesign</b> (Organizational Development Theory; Cummings & Worley, 2015; Jones, 2004)	Change organizational elements such as formal statements of organizational philosophy, communication flow, reward systems, job descriptions, and lines of authority.	Management authority and agreement.
<b>Increasing stakeholder influence</b> (Stakeholder Theory; Brown, Bammer, Batliwala, & Kunreuther, 2003; Kok, Gurabardhi, Gottlieb, & Zijlstra, 2015; R. K. Mitchell, Agle, & Wood, 1997)	Increase stakeholder power, legitimacy, and urgency, often by forming coalitions and using community development and social action to change an organization's policies.	The focal organization perceives that the external organization or group is one of its stakeholders.

Table 13: Methods to Change Communities (Adapted from Bartholomew et al., 2011)

Method (related theories and references)	Definition	Parameters
<b>Problem-posing education</b> (Conscientization Theory; Empowerment Theory; Freire, 1973a, 1973b; Wallerstein, Sanchez, & Velarde, 2004)	Participatory analysis using critical reflection, self-disclosure, and dialogue regarding the social forces underlying a problem and a commitment to change self and community.	A safe environment for participation and disclosure; a critical stance.
<b>Community assessment</b> (Models of Community Organization; Rothman, 2004)	Assessing a community's assets and needs, with feedback of results to the community.	Requires expert assistance and possibilities for feedback.
<b>Community development</b> (Models of Community Organization; Theories of Power; Minkler & Wallerstein, 2012; Rothman, 2004; Wallerstein et al., 2015)	A form of community organization, based on consensus, in which power is shared equally and members engage together in participatory problem solving.	Starting where the community is; may be grassroots or professional driven. Will often include consciousness raising, facilitation, goal setting and information about others' approval.
<b>Social action</b> (Theories of Power; Stakeholder Theory; Kok et al., 2015; Minkler & Wallerstein, 2012; Rothman, 2004; Wallerstein et al., 2015)	A form of community organization, based in conflict, in which disenfranchised people wrest power from the official power.	Starting where the community is; may be grassroots or professional driven. Will often include consciousness raising, persuasive communication, information about others' approval and modeling.
<b>Forming coalitions</b> (Models of Community Organization; Social Capital Theory; Butterfoss & Kegler, 2009; Butterfoss, 2007; Clavier & de Leeuw, 2013)	Forming an alliance among individuals or organizations, during which they cooperate in joint action to reach a goal in their own self-interest.	Requires collaboration across various agendas; requires attention to stages of partnership development. Will often include persuasive communication, consciousness raising, goal setting, facilitation and information about others' approval.
<b>Social planning</b> (Models of Community Organization; Rothman, 2004)	Using information based on research to address issues.	Requires credible source of the information.
<b>Framing to shift perspectives</b> (Models of Community Organization; Snow, 2004)	Assigning meaning and interpretation to relevant events and conditions in order to mobilize potential constituents, gain bystander support, and demobilize antagonists.	Match with culture.

Table 14: Methods to Change Policy (Adapted from Bartholomew et al., 2011)

<b>Method</b> (related theories and references)	<b>Definition</b>	<b>Parameters</b>
<b>Media advocacy</b> (Models of Community Organization; Dorfman & Krasnow, 2014; Wallack et al., 1993; Wallack, 2008)	Expose environmental agents' behaviors in the mass media to order to get them to improve health-related conditions. A type of advocacy.	Requires the media to approve the news value of the message and accept the message without changing its essential content.
<b>Agenda setting</b> (Multiple Streams Theory, Advocacy Coalition Theory, Theories of Power; Clavier & de Leeuw, 2013; Sabatier, 2003; Weible et al., 2009; Weible, 2008)	Process of moving an issue to the political agenda for action; may make use of broad policy advocacy coalitions and media advocacy.	Requires appropriate timing (see policy window) and collaboration of (media) gatekeepers. Will often include persuasive communication and consciousness raising.
<b>Timing to coincide with policy windows</b> (Multiple Streams Theory; Kingdon, 2003; Zahariadis, 2007)	Advocating policy when politics, problems and policy solutions are aligned to be receptive to a policy issue.	Requires an astute policy advocate who is well prepared
<b>Creating and enforcing laws and regulations</b> (Multiple Streams Theory, Theories of Power; Clavier & de Leeuw, 2013; Kingdon, 2003; Longest, 2006)	Forcing compliance or dictating or precluding choices. Sometimes Implementing existing laws to Accomplish change. Laws and regulations may also provide incentives.	Requires unequal power and availability of control and sanctions.

Table 15: Description of determinants, methods and applications; examples from Long Live Love, a school-based sex education program (Schaalma et al., 2011)

Determinants & Change objectives for Adolescents	Methods	Parameters	Applications	How population, context and parameters were taken into account
<p><b>Risk perception:</b> Recognize that they might land in situations in which contracting HIV and STIs can't be ruled out</p>	Scenario-based risk information	Plausible scenario with a cause and an outcome; imagery. Most effective when people generate their own scenario or when multiple scenarios are provided.	Role-model stories in textbooks; videotaped role modeling, where the videos were discussed in class	Population: adolescent models are used Context: videos can be shown in class and discussed Parameters: plausible scenario with a cause and an outcome; multiple scenarios; models are peers that are reinforced for the right behavior
<p><b>Attitude:</b> Describe their strong perception of the advantages of condom use and other safe-sex options</p>	Active learning	Time, information, and skills.	Inquiry teaching; group discussion; quiz; interviews	Population: experts indicated that adolescents are familiar with and like a quiz setting Context: teacher available for guidance and facilitation of the discussion and inquiry teaching Parameters: sufficient time and information; professional guidance
Recognize that advantages of safe sex outweigh disadvantages	Anticipated regret	Stimulation of imagery; assumes a positive intention to avoid the risky behavior.	Role-model stories; videotaped role modeling	Population: scenarios were selected that were realistic given situations that were common for the target population Context: videos can be shown in class and discussed Parameters: realistic scenarios, positive risk avoidance intention; models are peers that are reinforced for the right behavior
<p><b>Social influences:</b> Explain that peers plan to use condoms</p>	Information about others' approval	Positive expectations available in social environment	Role-model stories; videotaped role modeling; group discussion	Population: adolescents are particularly sensitive to social influence from peers, so peers' approval was communicated Context: by showing the videos in class, real life norms are also activated Parameters: peer norms are positive

**Skills & Self-efficacy:**

Express confidence in ability to buy condoms

Modeling

Attention, remembrance, self-efficacy and skills, reinforcement; identification, coping model.

Role-model stories; videotaped role modeling

Demonstrate effective condom use

Population: target population did not easily discuss openly buying and using condoms. Therefore, starting from a video that was watched together provided a relatively safe starting point.  
Context: Watching the video in class together provides a shared experience that facilitates frank discussion.  
Parameters: models are peers that are reinforced for the right behavior; application is combined with skills and self-efficacy training

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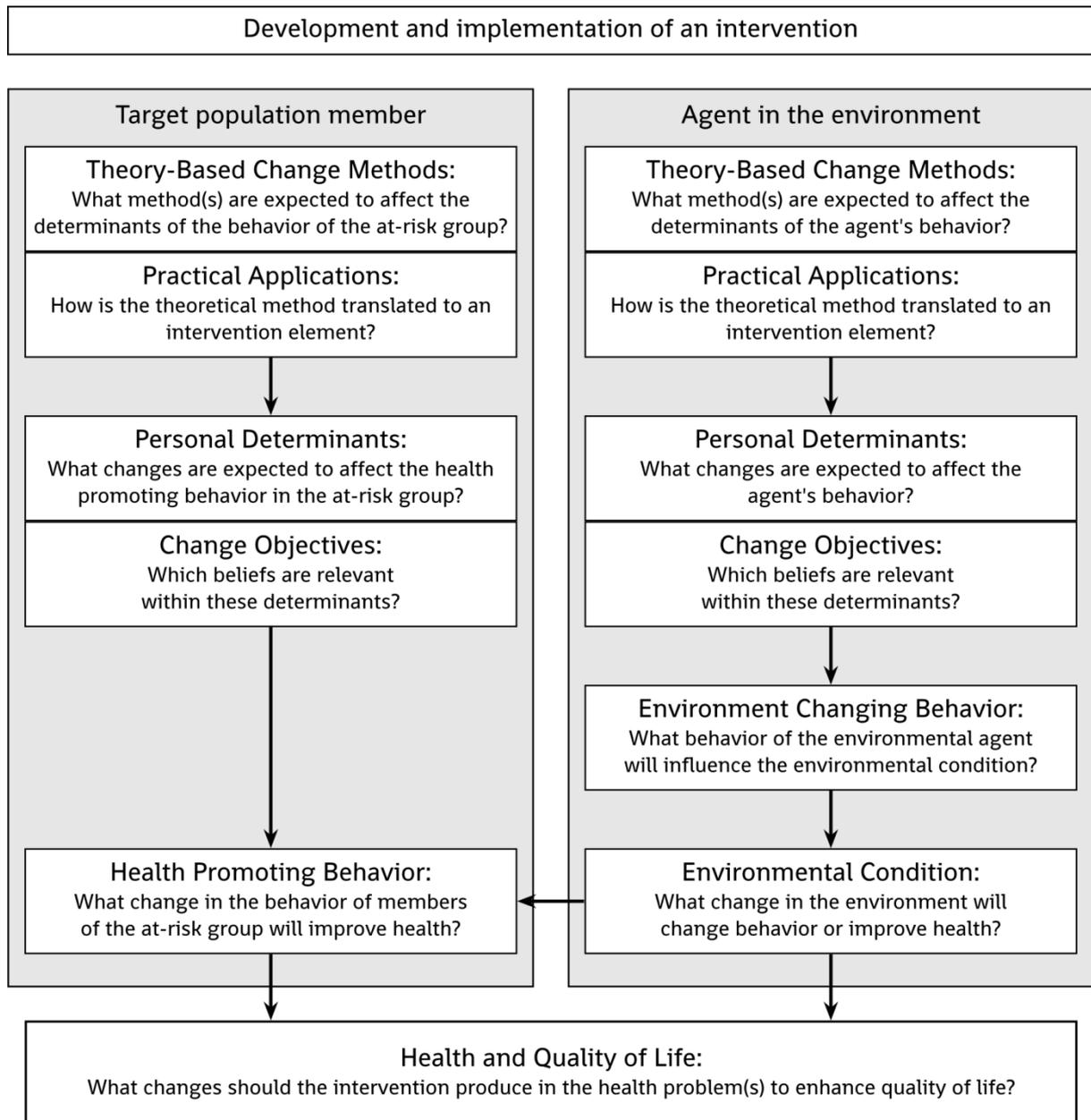


Figure 1: Similarity of the processes of change at the individual and environmental levels.

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