

## **Core Processes for Developing Theory- and Evidence-Based Interventions**

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### Abstract

Psychology is not only a basic social science but also an applied discipline that is used to solve all kinds of societal problems. In a problem-driven context, the search for existing literature, the correct application of appropriate theories, and the collection of additional research data are basic tools essential for the systematic development of any intervention. These Core Processes can be used in different phases/steps of intervention planning and within different planning frameworks. In this paper, Core Processes are presented in order to provide empirical and theoretical guidance to planners from problem definition to problem solution. Specific emphasis is put on finding theories that are potentially useful within the parameters that the theory describes using a combination of approaches (i.e., the topic, concept and general theories approaches).

*Keywords:* Core Processes, Applying theories, Applied psychology, Behavior change

### **Core Processes for Developing Theory- and Evidence-Based Interventions**

Within health psychology teaching programs at institutes of higher education, we train students to become experts in the understanding and promotion of behaviors that contribute to better population health, public safety, and sustainable environments. We target these behaviors at a variety of ecological levels, including the personal, interpersonal, organizational, community and societal level. Graduates of such programs are seen as experts on behavior change. They are expected to make informed decisions when it comes to identifying targets for behavior change interventions, selecting appropriate change methods to reach these targets, and translating these methods into practical applications that are tailored to the needs of the target populations and intervention contexts, while making sure these measures can also be implemented and their effectiveness can be assessed. But how sure are we that students have the necessary skills for making expert decisions? Expertise in intervention planning implies that planners not only have access to and know about information sources that could help them in finding answers to the above questions in processes of intervention planning, but also are able to translate the information gained from these sources in such ways that the final answers are indeed informed by expert opinion, empirical research, and theory, thus increasing the likelihood of designing effective behavior change interventions.

In the Netherlands, and many other countries, most of the psychology programs include a practical training on applying psychological theory. In such practical trainings, students find theory- and evidence-based explanations for practically relevant problems in which behavior plays a prominent role, such as in the prevention of infectious diseases (e.g., HIV infection) and the promotion of healthy lifestyles (e.g., sufficient exercise), the early detection of life-threatening diseases (e.g., cancer, diabetes), and promoting adherence to therapy and medical

regimes to prevent disease episodes (e.g., asthma) or even death (e.g., AIDS). These explanations are found through a systematic process of asking a question, brainstorming possible answers, looking for empirical evidence and theoretical support, conducting new research, and coming to a final list of answers to the question. This working method is originally described by Veen (1984) and in later years has been transformed into the PATH protocol (Buunk & Van Vugt, 2008; 2013). However, this systematic process to finding answers to questions – here referred to as Core Processes – is not limited to the understanding of problematic behaviors, but extends to the full planning process of intervention planning from analyzing the problem at hand (e.g., What personal and environmental factors cause the problematic behavior?), to selecting methods of change (e.g., How to effectively train resistance skills?), to designing implementable and evaluable interventions (e.g., What skills can I expect from school teachers, and what not?) (Ruiter et al., 2013).

In intervention planning, there are different planning frameworks available, such as PRECEDE-PROCEED (Green & Kreuter, 2005) and Intervention Mapping (Bartholomew Eldredge et al., 2016), that provide guidance to planners from problem definition to problem solution. These planning frameworks use different phases/steps to go from problem definition to problem solution in a systematic way, which optimizes change and the subsequent development, implementation and evaluation of an appropriate intervention. Across all these planning frameworks, applied psychologists may encounter the difficulty of using empirical evidence and theory in order to analyze the problem and inform behavior change interventions (Eccles, Grimshaw, Walker, Johnston & Pitts, 2005; Glanz & Bishop, 2010; Painter, Borba, Hynes, Mays & Glanz, 2008). Reviewing existing literature, applying appropriate theories, and collecting additional research data are basic tools in different phases/steps of planning frameworks, but

often it is unclear exactly how and when these tools should be used in problem analysis and solving (Buunk & van Vugt, 2008; 2013; Lave and March, 1993; Ruiter et al., 2013).

Here, *Core Processes* are presented as a helpful and systematic way to answer questions raised in different phases/steps of planning frameworks. We would like to stress that although these Core Processes are described within Intervention Mapping (Bartholomew Eldredge et al., 2016), they can be applied in any planning framework. So, Core Processes are not a planning framework on their own, but a helpful and systematic way to address questions relevant to problem definition and solution using theory and evidence. This is essential within problem-driven psychology.

### **Theory-Driven and Problem-Driven Psychology**

Within applied (health and social) psychology, a distinction can be made between two approaches: theory-driven and problem-driven applied psychology (Kok, Schaalma, De Vries, Parcel, & Paulussen, 1996). Theory-driven applied psychology involves testing a theory in an applied setting, primarily in order to gain insight into the external validity of the theory.

Problem-driven applied psychology refers to scientific activities that focus on changing or reducing a practical problem. In problem-driven applied psychology, theories are used, but problem solving is the primary focus of this approach, and the criteria for success are formulated in terms of problem reduction, with contributions to theory seen as a useful by-product. Problem-driven applied psychologists start with a thorough analysis of the practical problem in question, and consider multiple theoretical perspectives in an attempt to find answers to this problem.

Problem-driven applied psychology is an important field, because it provides an ultimate test for the usefulness of psychology both as a discipline and as a profession.

Behavior change is a subfield within applied (health and social) psychology that is very much problem-driven. The problems that are addressed are often complex and require a multidisciplinary approach. For example, the Focus on Strength project combined existing ideas, evidence and theory from biological and psychological perspectives to address the negative health consequences associated with obesity (Ten Hoor et al., 2017). From a biological perspective, there is evidence suggesting that the negative effects of obesity on health are not caused by absolute or relative (BMI) weight, but rather by an unhealthy body composition: the ratio of body fat mass to body fat free mass. Hence, it is better to shift the focus away from losing body weight, and to concentrate instead on improvements in body composition. From a psychological perspective, it is better not to focus on what people *need* to do in order to become healthier, but rather on what people *want* to do (intrinsic motivation). People who are overweight or obese are often physically stronger (in an absolute sense) than normal weight individuals (see Ten Hoor et al., 2014). Hence, using strength exercises to promote a healthier body composition might (partly) solve the problem regarding the negative health consequences associated with obesity (Ten Hoor, et al., 2016). Although using strength exercises may seem, at first glance, a rather simplistic way of addressing the complex problem of obesity, it requires psychological expertise to apply psychological principles from social comparison theory (Suls & Wheeler, 2013) and self-determination theory (Ryan & Deci, 2006) in such a way to create the right circumstances and design an effective behavior change intervention (Ten Hoor et al., 2018). This example shows how combining biological and psychological evidence and theories resulted in a very clear, novel idea to promote strength training. And, how the idea that overweight individuals are stronger than their normal weight counterparts led the psychologists in the multidisciplinary planning group to apply lesser-known but very helpful theories such as the

theory of social comparison on multiple dimensions (Lemaine, 1974; Van Knippenberg et al., 1981). This example also shows that behavior change is difficult. “If it was easy, we would not need experts in change” (Kok, 2016, p. 20). So, although the required expertise within multidisciplinary planning groups may vary based on the problem that is addressed, expertise in behavior change (e.g., an applied psychologist) is always required.

### **Core Processes for Using Theory and Evidence**

Processes involved in answering a question using empirical data and theory can be complex and time-consuming; sometimes planners do not persevere in working through these difficulties. Consequently, the understanding of a (health) problem is often incomplete, and attempts to solve the problem may be based on faulty premises/assumptions. Core Processes are crucial to answer questions in such a way that the chances of adequately addressing the problem at hand are optimized. Using Core Processes minimizes the likelihood of incomplete understanding and selecting ineffective solutions. These Core Processes include the following six steps as depicted in Figure 1 and described below.

Core Processes	Tasks
<b>1. Pose questions</b>	Initial questions are usually asked in order to ascertain causes of the health problem. Subsequent questions are asked in order to identify determinants of behavior and environmental conditions, and to help develop interventions and anticipate implementation.
<b>2. Brainstorm possible answers</b>	Planning group members brainstorm to create an (unedited) list of possible answers. In this way, the group members can ascertain their current knowledge and practice wisdom and can make a list of provisional answers.
<b>3. Review empirical findings from published research</b>	Support or refute provisional answers to the questions based on a review of available empirical findings.
<b>4. Finding theoretical support using the topic, concept and general theories approaches</b>	Find theories or combinations of theoretical constructs, first to understand, and then to solve the problem at hand, by applying the following approaches: (1) <i>Topic approach</i> : refine, add to, and discard provisional answers based on theoretical concepts from the empirical literature; (2) <i>Concept approach</i> : access theories through concepts generated during brainstorming; (3) <i>General theories approach</i> : consider potentially useful general theories.
<b>5. Identify and address the need for new research</b>	Use a combination of qualitative and quantitative techniques to suggest changes to – or add to – the provisional answers.
<b>6. Complete and assess the list of possible answers</b>	Complete the provisional list of answers and summarize into a working list for which the evidence is sufficient. Assess the answers in terms of relevance and changeability.

Figure 1: Core Processes for Using Theory and Evidence.

### Step 1. Pose Questions

The first step when following the Core Processes is to pose (the right) questions. The first questions are often asked as a means of analyzing possible causes of the health problem (e.g., what are important risk behaviors?). Later questions are used to identify determinants of behavior and environmental conditions, and help to both develop interventions and plan intervention implementation. Subsequently, the focus of the questions shifts to potential solutions or theory- and evidence-based change methods (e.g., what change methods relate to

what determinants? how can change methods be translated into appropriate practical applications?).

The questions that need to be answered can vary from problem to problem and differ across the different planning frameworks. It is crucial, therefore, that the planning group is on the same page regarding *which* question needs to be answered at *what* moment (e.g., problem analysis, identifying determinants, selecting change methods), before continuing with the second step of the Core Processes. Lack of clarity about the question that has to be answered might lead to a feeling of being lost in translation during subsequent steps.

### **Step 2. Brainstorm Possible Answers**

The second step concerns “brainstorming” about possible answers and using “free association.” Here, planning group members generate an (unedited) list of possible answers to a particular question. In this way, the group members can ascertain their current knowledge and practice wisdom. This is a creative process that primarily involves free association with the aim of generating as many explanations as possible in response to a question. The planners can later disregard explanations that are poorly supported in the literature. Planners should avoid focusing on a single explanation too soon. In formulating these provisional explanations, applied behavioral scientists typically draw on theoretical and empirical knowledge, whether consciously or not. Doing so is unavoidable at this stage, but the brainstorming should be as open as possible and should not be limited to data- or theory-informed. In the next steps, empirical findings (of existing research in step 3 and new research in step 5) and theoretical support (step 4) are incorporated to avoid haphazard decisions based on a brainstorm only.

With regard to this preliminary list, there is no reason for planners to favor one explanation over another; however, in the subsequent stages, the planning group should bear in

mind that: (1) an explanation should describe a process (an explanation of causation), and (2) an explanation should be plausible. For example, socioeconomic status may be an important contextual factor – or even a root cause – of certain behaviors, but it may need to be explored further in order to better describe a process that explains behavior. It may be useful to represent the explanation in a process model that shows causation (Buunk & Van Vugt, 2013), also known as logic model (Ruiter et al., 2013).

### **Step 3. Review Empirical Findings from Published Research**

The next step is to support or refute provisional answers to the questions that the planning group has asked with empirical and theoretical evidence, starting with reviewing findings from published research. The idea behind this is to disregard explanations that are poorly supported in the literature. We suggest to start searching for reviews that have already been conducted. There are many sources available in the burgeoning field of systematic reviews and evidence-based public health that are worthwhile to consult before looking for individual studies. When appraising available reviews, or conducting a new one (see Peters, 2014 for basic how-to guidance), it is warranted to at least understand the nature of the numerator (what studies are used in the evidence summary) in terms of the denominator (what studies were conducted or reported), and to be aware of the variation that exists in the quality of evidence. Of course, the later also applies when assessing individual studies.

### **Step 4. Find Theoretical Support Using the Topic, Concepts and General Theories**

#### **Approaches**

The search of the literature is mostly focused, for example, on a specific behavior, or target group or culture. However, it might be that there is limited literature available (e.g., regarding a certain behavior or target group) or that the literature is limited in scope (e.g.,

focusing on a limited number of explanations). The next step, therefore, is to find theoretical support for the provisional explanations and to make the provisional list of answers as extensive as possible before conducting new research (i.e., step 5) and making decisions (i.e., step 6).

Theory refers to a well-substantiated explanation of some aspect of the natural world, based on a body of facts that have been repeatedly confirmed through observation and experimentation (Van Ryn & Heany, 1992). Theories can thus be defined as formal and abstract statements about a selected aspect of reality (Conner & Norman, 2015; DiClemente, Salazar, & Crosby, 2013; Glanz, Rimer, & Viswanath, 2015; Simons-Morton, McLeroy, & Wendel, 2012). As a consequence of their very nature, theories are always a reduction of reality. This is not a shortcoming, but rather a definition, which is important to keep in mind when using theory in addressing problem-driven problems. Real-life problems are – by definition – complex; otherwise, they would already have been solved without the need to involve researchers. It follows, then, that a multi-theory approach is required (Bartholomew Eldredge et al., 2016; pp. 25) in order to further understand and solve real-life problems. This is also why intervention studies do not necessarily lead to improvements of a single theory (Prestwich, Webb, & Connor, 2015). From this perspective, applying theory to real life problems can be likened to completing a jigsaw puzzle with various theories fitting together to provide an explanation or answer to a planning question (Peters & Crutzen, 2017). The argument that one theory – for example, the Reasoned Action Approach – cannot explain all the possible variances in behavior or behavior change is therefore no reason to discard the theory altogether (Kok & Ruiter, 2014). Not being able to explain all variance in behavior could only be held against a ‘Theory of Everything’, and there are good reasons why such a theory is undesirable (Peters & Crutzen, 2017).

In a problem-driven context, all theories, theoretical models, and concepts are potentially useful within the parameters that the theory describes (Buunk & Van Vugt, 2013). All theories deal with bounded aspects of reality. So, they provide a well-substantiated explanation of some aspect of the natural world, but if other aspects are not or under-represented in a theory, then this should not be taken as undermining the well-substantiated explanation (Peters & Crutzen, 2017). Moreover, there are common and unique elements regarding each theory (Noar, 2005; Sniehotta, Presseau, & Araújo-Soares, 2014). One challenge is to find the best theories (or combination of theoretical constructs) to answer planning questions. Limiting the pool of candidate theories too soon may lead to inadequate answers or, worse, it may lead to conclusions being drawn that are counterproductive. There are three approaches to finding theories: the topic, concept and general theories approaches; these should be utilized in combination but also in that order.

***The topic approach:*** Going back to the literature review, the planning group needs to look specifically for theoretical concepts and frameworks that have been used to design the reported empirical studies and/or explain the findings. They then assess these theories in terms of how useful they are for providing additional answers to the formulated question.

***The concept approach:*** A second approach to find theory-informed answers to the question being asked is to examine concepts that are generated during brainstorming sessions in the second step. It is likely that the ideas resulting from these brainstorming sessions are initially stated in lay terms, but there may be advantages to relabeling them with their theoretical labels. The information that can be garnered about a theoretical construct can be more precise than that related to a simple lay concept (e.g., lack of confidence could also be labeled as the theoretical construct self-efficacy).

One person cannot be familiar with all potentially useful theories. This is why it is advisable to include individuals from various disciplines in the planning group and it stresses once again that expertise in behavior change (e.g., an applied psychologist) is always required. It is also worth noting that reading comprehensive overviews of theories may aid this process (Bartholomew Eldredge et al., 2016, Chapters 2 and 3; Conner & Norman, 2015; DiClemente, Salazar, & Crosby, 2013; Glanz, Rimer, & Viswanath, 2015; Simons-Morton, McLeroy, & Wendel, 2012).

***The general theories approach:*** After the topic and concept approaches, a general theories approach involves exploring a theory that may offer insight into the question at hand. At this stage, it may be fruitful to consider alternative frameworks that have not been accessed through the other two approaches but that could provide valuable information for further extending and refining the list of explanations. For example, dual process models of human behavior that differentiate between impulsive or automatic decision making and more reasoned routes of planning (e.g. Strack & Deutsch, 2004), or theories of self-regulation and self-management (e.g., Mann, de Ridder, & Fujita, 2013) may be informative. The general theories approach should be seen as a last resort before continuing with the next step to prevent falling back in a theory-driven rather than problem-driven approach in tackling societal problems. When there is tension between generalizability and utility of theories, utility should be given preference given the applied nature of the problem-driven approach (Head & Noar, 2014).

### **Step 5. Identify and Address the Need for New Research**

It is important that the planning group completes the previously described steps instead of jumping straight into research. A very practical reason is that conducting new research requires a lot of resources (in terms of time, expertise and money). More important, all evidence and

insights that are available should be used before conducting new research. There are a lot of options between ‘doing nothing’ and ‘conducting new research.’ Therefore, the order of steps is crucial; brainstorming (step 2) ensures utilizing theoretical and empirical knowledge that is available within the planning group, which can later be combined with empirical findings (step 3) and theoretical support (step 4). In fact, going through these steps might actually improve new research: if new research needs to be conducted, then it should be clear what questions to ask and address in the research. As a result of completing the previous steps, the planners will have assembled a set of potential answers from both the theoretical and the empirical literature that fit with, suggest changes to, or add to the provisional explanations. In some cases, this information provides insight into the exact processes underlying the provisional answers. The information may, at the same time, raise questions that the planning group had not thought of before. For example, the planning group may want to know whether certain theoretical constructs that look promising are actually explanatory in relation to their population of interest. They may also want to know the particular way in which an explanation found in published research relates to their population. Moreover, Ajzen (2015) recommends to always conduct a thorough elicitation procedure among the target population to identify the relevant beliefs underlying the determinants that predict the intention. Often, a combination of qualitative and quantitative techniques is used to explore the questions of interest within a certain population (Creswell, 2013; De Vries, Weijts, Dijkstra, & Kok, 1992; Morgan, 2007; Steckler, McLeroy, Goodman, Bird, & McCormick, 1992).

#### **Step 6. Complete and assess the list of possible answers**

At this point, the planning group is ready to summarize and complete the provisional list of answers into a working list of items for which the theoretical and empirical evidence is

evaluated as sufficient. The planners will consider the criteria of plausibility and process and also assess potential answers for relevance (or importance) and changeability.

*Relevance* refers to the strength of the evidence for the association between the determinant and the behavior. As mentioned before, determinants should be specified at the level of beliefs, for example the specific beliefs that underlie an attitude or self-efficacy (Ajzen, 2015). Fishbein and Ajzen (2010) suggest that theory can guide the selection of beliefs that need to be targeted in an intervention in order to bring about behavior change. In this way, messages can be designed – with the help of behavior change theories - to strengthen positive beliefs, weaken negative beliefs, and introduce new beliefs. Crutzen, Peters, and Noijen (2017) provide a practical approach to select determinants based on visualization of confidence intervals for the means and correlation coefficients for all determinants simultaneously. This visualization facilitates comparison, which is necessary when making selections regarding the most relevant determinants. Ideally all relevant determinants are targeted in an intervention, but there might be practical considerations prohibiting this. For example, there are limits in terms of resources available for intervention development and the amount of content that participants of an intervention can be exposed to within a certain time period. To optimize intervention effectiveness, the selection of which determinants will be targeted by an intervention should be guided by determinant relevance.

To do so, insights from associations (e.g., correlation coefficients) should be combined with univariate distributions of data regarding determinants (Hornik & Woolf, 1999). For example, if a determinant is positively associated with behavior but left-skewed (i.e., most people score above the midpoint of the scale), most population members already have the desired value, so an intervention developer will want to reinforce it. Conversely, right-skewed (i.e., most

people scoring below the midpoint of the scale) positively associated determinants imply a need for change, as most population members do not have the desired value yet. This latter category of determinants would be more relevant intervention targets, should a choice have to be made: there is more room for improvement.

With regard to assessing relevance, the current literature is dominated by cross-sectional determinant studies (Weinstein, 2007), although there are also experimental studies available (Sheeran et al., 2016; Webb & Sheeran, 2006; Sniehotta, 2009). Of course, experimental studies are needed to provide inside into the causal influence of changing certain determinants. This does not mean that such influences are necessarily unidirectional. In fact, many theories assume a reciprocal relationship. For example, Bandura denotes this as reciprocal determinism in his Social Cognitive Theory (Bandura, 1986). Weiner's attributional model, as another example, indicates that unexpected or negative behavioral outcomes lead a person to search for causal ascriptions (e.g., specific beliefs) that can explain the outcomes (Weiner, 1985).

***Changeability*** refers to the strength of the evidence suggesting that the proposed change can be realized by an intervention. This requires planners to consider the notion that some determinants may be changed by interventions directed at the individual and other determinants may be better targeted by interventions directed at the environment. The evidence for changeability can be found in studies that focus on changing a specific determinant, and studies that focus on methods used to change a specific behavior and/or setting (e.g. Van Empelen et al., 2003; Kok, et al., 2012; Schaafsma, et al., 2015; Sheeran et al., 2014). Behavior change expertise is also needed to make judgments regarding changeability. For example, it is often assumed that knowledge about a certain behavior is relatively easy to change in comparison with self-efficacy toward that same behavior. Whenever possible, judgments regarding changeability should be

based on evidence from the research literature (Ashford et al., 2010). However, when data regarding changeability are scarce, such judgments have to rely on a theoretical or conceptual basis.

Of note, it makes sense that there is often a negative correlation between relevance and changeability: relevant factors are difficult to change and vice versa. As a result, determinants that remain on the list are both somewhat relevant (or relevant enough) and somewhat changeable (or changeable enough). Once this process has been completed, the planning group will have enough information to be able to finalize the list of answers.

### **Example: Applying Core Processes**

The following example nicely illustrates the use of the Core Processes (Bartholomew Eldredge et al., 2016, p. 21-28). In this example, a group of students in a health education class designed a project to prevent the transmission of HIV and other sexually transmitted infections (STIs) and pregnancy among urban adolescents.

#### **Step 1. Pose Questions**

Over the course of the project, they asked a number of questions, including: (1) *Health problem*. What are the health problems associated with HIV, STIs, and pregnancy in adolescents (ages 13–18) in the USA? (2) *Behaviors*. What are important risk behaviors for the transmission of HIV and STIs, and for pregnancy among adolescents? How do these risk behaviors vary for different groups, for example, differences between boys and girls? (3) *Determinants*. About the *risk* behavior: Why don't adolescent males use condoms when having sex with steady girlfriends? Why do girls have sex with boys who do not use condoms? About the *health-promoting* behavior: Why would girls carry condoms? Why would adolescents discuss condom use with their partners? What barriers do they perceive when buying condoms? (4) *Change methods*. How can we encourage specific subgroups of adolescents to use condoms? What

change methods relate to what determinants? How can change methods be translated into appropriate practical applications? What would an intervention designed to prevent HIV transmission consist of? How could such an intervention be implemented?

### **Step 2. Brainstorm Possible Answers**

Using “free association,” planning group members generate as many explanations as possible that can later be dropped when poorly supported (Ruiter et al., 2013). Trained behavioral scientists already know a lot about determinants of behavior and barriers for change and this knowledge should be used. In Table 1, the first column represents the outcome of the brainstorm regarding determinants of condom use.

Table 1: List of Answers Regarding Condom Use Among Adolescents (Bartholomew Eldredge et al., 2016, pp. 21-28).

<b>Step 1: Pose Questions</b>			
<b>Step 2: Provisional list resulting from brainstorming</b>	<b>Step 3: Additions from empirical literature</b>	<b>Step 4: Theoretical additions</b>	<b>Step 5: Additions from new research</b>
Lack of knowledge about HIV transmission	Do not perceive condoms as means of pregnancy prevention	Intention to use condoms	Lack of knowledge about HIV or STIs disconfirmed
Lack of knowledge about STIs	Perceive condoms as embarrassing	Subjective norms	Argument that condoms don't work is an excuse, not a belief
Peers don't use condoms	Did not express personal responsibility for having condoms	Perceived norms	Experience with condoms associated with embarrassment
Perception that condoms don't work	Lower family connectedness	Self-efficacy for negotiating and discussing condom use with partner	Teens wanted to be more skillful
Attitudes toward condom use	Parents' permissive attitudes towards sex	Skills	Girls and boys both expressed that condoms were the responsibility of the other gender
Experience with condom use; don't like condoms	Community perceptions of gender inequality in sex	Outcome expectations	Perception of no risk of HIV with only one partner (mistook "serial monogamy" for monogamy)
Gender; males do not want to use condoms	Closed communication style		
Lack of salience - not knowing someone with AIDS	Neighborhood characteristics, such as high unemployment		
Lack of confidence in using condoms	Lack of access to family planning services		
	Lack of parental supervision		
	Parental trust		
<b>Step 6: Complete and assess the list of possible answers</b>			

### **Step 3. Review Empirical Findings from Published Research**

The second column in Table 1 presents the outcomes of the review on the evidence supporting the results of the brainstorm. The intervention planners identified empirical evidence for some issues related to unprotected sex that were not already brainstormed, for example not perceiving condoms as a means of pregnancy prevention (Bobrova, Sergeev, Grechukhina, & Kapiga, 2005); perceiving condoms as embarrassing (Bell, 2009; Brüll et al., 2018); not taking personal responsibility for having condoms (Parkes, Henderson, & Wight, 2005); low family connectedness, and parents' permissive attitudes towards sex (Kao & Manczak, 2013); perceptions of gender inequality in sex (Bauman, Karasz, & Hamilton, 2007); and having a closed communication style (Crosby et al., 2000). The planning group also identified a number of studies that reported the relationship between unsafe sex and various theoretical constructs (listed in the third column): intention to use condoms and perceived norms (Bobrova et al., 2005; Villarruel, Jemmott, Jemmott, & Ronis, 2007) and self-efficacy in terms of negotiating and discussing condom use with partners (Bell, 2009; Black, Sun, Rohrbach, & Sussman, 2011). Ideally, those concepts (as depicted in Table 1) should be specified at the level of beliefs, for example the specific beliefs that underlie an attitude or self-efficacy (Ajzen, 2015). The planning group also became interested in information on the wider social context that could shed light on why adolescents might not protect themselves against pregnancy and STIs: community characteristics—such as a high proportion of families living below the poverty line, a low level of education, and high unemployment—were all found to be strongly related to teenage pregnancies (Penman-Aguilar, Carter, Snead, & Kourtis, 2013). Neighborhood economic disadvantage, high unemployment (Bauermeister, Zimmerman, & Caldwell, 2011), and restricted access to family planning services, have all previously been described as barriers to adolescent

contraceptive use (Averett, Rees, & Argys, 2002; Smith, Novello, & Chacko, 2011). Lack of parental monitoring and parental trust, and unsupervised time have all been associated with risky sexual activity (Borawski, Ievers-Landis, Lovegreen, & Trapl, 2003).

#### **Step 4. Find Theoretical Support Using the Topic, Concepts and General Theories**

##### **Approaches**

*Topic approach:* The literature review identified a meta-analysis study on the psychosocial determinants of condom use in heterosexual populations by Sheeran, Abraham, and Orbell (1999). In the introduction and discussion sections, these authors refer to different psychosocial theories of (health) behavior such as the Health Belief Model (Skinner, Tiro & Champion, 2015), the Theory of Planned Behavior (Montaño & Kasprzyk, 2015), and the Aids Risk Reduction Model (Catania, Kegeles, & Coates, 1994). By studying these theories in detail, additional answers can be added to the list of potential explanations that are supported by theories of human behavior (Table 1, third column).

*Concept approach:* Lack of confidence appeared on the original list. This concept could also be labeled as the theoretical construct self-efficacy. By further exploring the construct of self-efficacy in the literature (Bandura, 1986; Mulvihill, 1996), the planning group may then also discover that self-efficacy is closely related to skills, perceived norms, and outcome expectations. As a result, they could add perceived norms and skills for negotiating condom use and applying a condom to the list (Table 1, third column). In this additional exploration of the theoretical literature, the group may encounter methods for influencing self-efficacy and think ahead in terms of how to apply this in the intervention. None of this useful information would have been available if the group had not related confidence to the concept of self-efficacy and studied the underlying theoretical framework.

**General theories approach:** The planning group could have used the general theories approach to access Social Cognitive Theory (Kelder, Hoelscher, & Perry, 2015), but of course the topic and concept approaches would most likely also have led the planning group to this theory.

### **Step 5. Identify and Address the Need for New Research**

In the next step, the planning group needed more information from their priority population about the items on the provisional list in order to determine whether these proposed factors were relevant to their particular population. To this end, the group conducted focus groups with seventh- and eighth-grade students from the priority population. The purpose of the qualitative data collection was to explore students' knowledge, attitudes, and beliefs about dating and relationships, sexual behavior, condom and contraceptive use. The new data called into question the notion of a lack of knowledge about HIV or STIs in the adolescent population. Interestingly, the adolescents also felt that the argument 'condoms don't work' is more of an excuse and less of a belief about their effectiveness. The adolescents who had tried condoms expressed some embarrassment with the process of using condoms and a need for a greater level of skills and self-efficacy. With this new information (Table 1, fourth column), the planning group was able to proceed to the final step.

### **Step 6. Complete and assess the list of possible answers**

In the final step, the planning group completes the provisional list of answers and summarizes it into a working list for which the evidence is sufficient. This is essential to come to a well-evidenced answer to the planning question that was posed at the beginning. We have acknowledged that in the brainstorm the group members can ascertain their current knowledge and practice wisdom, which can later be disregarded if there is poor support in the literature

(both previous empirical studies and theories) and in newly conducted research. The provisional list of answers from the brainstorm is thus followed up by a list of answers for which theoretical and empirical support has been sought. In step 6, the planning group then decides whether the evidence is sufficient by assessing the answers in terms of relevance *and* changeability. With regard to selecting determinants, this final list is often depicted in a process model (Buunk & Van Vugt, 2013), also known as logic model (Ruiter et al., 2013; see Figure 2 for a logic model over the overarching project from which this example was derived).

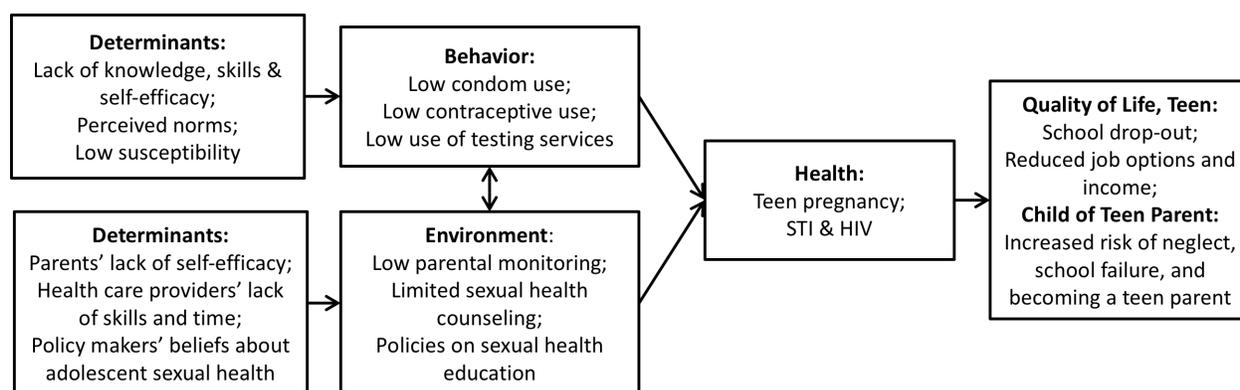


Figure 2: Logic Model with Relevant and Changeable Determinants (adapted from Bartholomew Eldredge et al. 2016, Page 259).

### Core Processes for Selecting Change Methods

For brevity and consistency reasons, the example used above to illustrate the Core Processes in answering questions with empirical and theoretical support mainly concern selection of determinants (i.e., addressing ‘why’ questions). We would like to stress that Core Processes also need to be used to select change methods for behavior change or to systematically plan implementation and evaluation of interventions (Bartholomew Eldredge et. al., 2016). In other words, to also address ‘how’ questions. The focus of the questions then shifts to potential

solutions or theory- and evidence-based change methods, for example: How can we encourage specific subgroups of adolescents to use condoms? How can change methods be translated into appropriate practical applications? In relation to a solutions or methods question, answers that remain on the list after engaging in all Core Processes will be methods that have been shown to produce significant change in similar situations. Kok et al. (2016), for example, provides tables with theoretical methods (and their limiting conditions) for every major determinant and for all higher environmental levels, i.e. interpersonal, organizational, community, and policy levels. It is important to bear in mind that theory-based methods are only effective under certain limiting conditions, i.e. the parameters of use (Schaalma and Kok, 2009). When these parameters are ignored – or lost in translation from behavior change method to practical application – effective behavior change is undermined and the intervention may even result in unintended or counterproductive effects (Peters, de Bruin, & Crutzen, 2015). Parameters for use are another example stressing that although the required expertise within multidisciplinary planning groups may vary based on the problem that is addressed, expertise in behavior change (e.g., an applied psychologist) is always required. For example, when using operant conditioning, one should be familiar with differences between performance of fixed-ratio, variable-ratio, fixed-interval, and variable-interval schedules (Ferster & Skinner, 1957) as well as the existence of the partial-reinforcement effect (Humphreys, 1939). This implies that development of intervention components also necessitates insight into fundamental research from fields such as experimental psychology and cognitive psychology (Johnston, 2016).

### **Conclusion**

Health and social psychology is an applied discipline in which all kinds of societal problems and issues are addressed. The search for existing literature, the correct application of appropriate

theories, and the collection of additional research data are basic tools essential for the systematic development of any intervention. It is, however, often unclear exactly how and when these tools should be used in problem analysis and solving. Core Processes are presented as a helpful and systematic way to answer questions raised in different phases/steps of planning frameworks. So, Core Processes are not a planning framework on their own, but a way to address questions relevant to problem definition and solution using theory and evidence.

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