Parent-Based Interventions to Reduce Adolescent Problem Behaviors: New Directions for Self-Regulation Approaches

James Jaccard and Nicole Levitz

Center for Latino and Adolescent Health
New York University

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Parent-Based Interventions to Reduce Adolescent Problem Behaviors: New Directions for Self-Regulation Approaches

Parent-based interventions to prevent adolescent problem behaviors have a long but mixed history in the social sciences. On the one hand, there are a large number of parent-based interventions that have failed in their attempts to prevent classic adolescent problem behaviors, such as risky sexual behavior, drinking behavior, delinquency, and smoking. On the other hand, there also are programs that have empirically substantiated non-trivial effects on such behaviors. In the present chapter, we first review the key elements of a successful framework that we have developed for parent-based interventions aimed at preventing adolescent problem behaviors focused on sexual behavior, tobacco use, and alcohol use, separately. We then describe a new research agenda that draws on self-regulation theory that can be used to improve these programs.

A FRAMEWORK FOR DESIGNING PARENT BASED INTERVENTIONS

There are two general types of parent-based programs aimed at reducing adolescent problem behaviors. One strategy uses a positive youth development approach, where the focus is on maximizing areas of positive development. The logic is to maximize cognitive development, social development, emotional development, moral development, and physical development of youth with the idea that this, in turn, should lead to lowered levels of drug use, alcohol use, unintended pregnancy and other problem behaviors. These strategies do not target a specific problem behavior per se, but instead focus on general constructs that are thought to underlie positive development, such as the ability to delay gratification, emotion regulation, and empathy skills. Parents are taught parenting strategies and skills that impact these general constructs. The second strategy takes the position that such a focus is not enough. In addition to positive development, one also must directly address the specific problem behaviors, each of which has unique determinants that transcend the common influence of general areas of psycho-social development. For example, whether an adolescent experiments with and eventually becomes dependent on alcohol is not just impacted by general developmental phenomena but also by specific experiences adolescents have with alcohol and the alcohol laden contexts in which youth are embedded. Our framework for parent-based interventions strikes a balance between these two approaches, but the emphasis

of the current chapter is on the latter approach, namely behavior specific interventions.

Parent-based intervention programs target adolescent behaviors but use the parents of adolescents as change agents. Our task as interventionists is to advise parents on how to become effective change agents and to help parents implement our advice. There are multiple types of theories we draw upon in such efforts. First, we use a general theory of behavior to identify the malleable determinants of a behavior for both adolescents and parents alike. It is only by understanding why adolescents do what they do that we can give good advice to parents about how to prevent adolescent problem behaviors. We also apply this same behavioral model to the analysis of parental behavior so that we can convince parents to perform the behaviors that they need to perform to be effective change agents. For example, in addressing adolescent sexual risk behavior, our research shows that adolescent perceptions of parental attitudes towards them having sex impacts their decisions to have sex. One piece of advice we give parents is to talk with their children about sex and to make clear where they stand on the matter. However, many parents do not have such conversations. By applying our general theory to this parental behavior, we learn why parents fail to speak with their children about sex and then structure our intervention to address this, thereby increasing parent-adolescent communication.

In addition to the above theory, we make use of theories of parenting that inform us about effective parenting strategies more generally. These theories include attention to such constructs as (a) parental monitoring and supervision of their children, (b) parental discipline strategies for when children transgress from parental expectations and rules, (c) parental communication strategies, (d) strategies for fostering high levels of relationship satisfaction between parent and child, and (e) general parenting behaviors focused on warmth, control, and shared activities.

Our intervention efforts seek to reach large numbers of parents in cost efficient ways that do not place burdens on agencies and organizations that wish to implement the programs. For example, in most settings, it is unrealistic to expect parents to attend more than one or two intervention sessions lasting a few hours each. To be sure, research studies supported by grant dollars can motivate and pay parents incentives to attend multiple session interventions, but in real world, resource poor settings, such interventions are not feasible for reaching large numbers of families. As such, we strive to have impact but under the constraint that, at most, we have two 3-4 hour sessions of face-to-face contact with parents. This is a non-trivial and challenging constraint.

It is not our purpose to discuss in this chapter the many strategies and heuristics we

have evolved in our research program to create brief, high impact, resource respectful parent-based interventions. For empirical examples of successful programs in our research endeavors, see Guilamo-Ramos, Bouris, Jaccard, Gonzalez, McCoy & Aranda (2011), Guilamo-Ramos, Jaccard, Dittus, Bouris, Gonzalez, Casillas & Banspach (2011), Guilamo-Ramos, Jaccard & Dittus (2010), and Turrisi, Jaccard, Taki, Dunnam & Grimes, (2002). We focus our attention instead on more narrow aspects of our intervention efforts so that we can develop what we believe are important "next-steps" for advancing this type of intervention research

A GENERAL THEORY OF BEHAVIOR FOR PARENT INTERVENTIONS

As noted, a key facet of our intervention framework is the use of a general theory of behavior so that we can identify the malleable determinants of adolescent and parent behaviors on which to focus our interventions. A popular theory of human behavior proposed by Fishbein and Ajzen (2010) is their recently elaborated Reasoned Action Model (RAM). We use a variant of this approach in our efforts, although our version takes a broader view of the determinants of behavior than theirs. Despite this, our approach draws heavily on core constructs within the RAM.

Behavioral Intentions and Behavior

Our framework begins with a simple and somewhat pedestrian proposition, namely that a person's behavior is influenced by his or her intention or decision to perform the behavior: If people intend to do something, they usually will do it, and if they do not intend to do something, they usually will not do it. If you want to know whether an adolescent will perform a behavior, simply ask him or her if s/he intends to do so. If the adolescent says "yes," then predict that s/he will perform the behavior; if the adolescent says "no," predict that s/he will not perform the behavior. In most cases, your predictions will be quite accurate.

This simple proposition, of course, belies the complexities surrounding the relationship between someone's intention to perform a behavior and performance of that behavior. Sometimes people intend to do something yet fail to do it. Other times, people do not intend to do something and end up doing it anyway. Many factors influence the extent to which an intention measured at one point in time forecasts behavior at a later point in time.

One factor that impacts our ability to predict behavior from a measure of intention is

the timing of the measurement of the intention and the observation of the behavior. Generally speaking, assessing an intention shortly before a behavior is to be performed yields more accurate prediction of behavior, everything else being equal. For example, asking a mother if she intends to go to a parenting program on adolescent problem behaviors one month prior to the program will not be as predictive as asking her the same question the day of the program. Obviously, it is not the passage of time per se that affects the relationship between intention and behavior; instead, something happens during the time interval to affect the intention or the ability to execute the behavior. Perhaps during the intervening month the mother finds an alternative program she would rather participate in. Perhaps the mother hears from a friend that the program is a waste of time. In both cases, the originally measured intention has changed and is now irrelevant. Changing one's mind at the last minute is a common reason previously measured intentions do not predict behavior.

Behavior often requires knowledge, skills, and abilities to perform. For example, in order to attend a program, there may be certain planning skills that are necessary to effectively organize one's life so that one can attend. Without such skills, a mother may not show up at a program even though she fully intended to. She just could not effectively plan and in turn does not participate.

Sometimes behavior is dependent on other people or events. A high school graduate may intend to go to Harvard for college, but if his or her application is not accepted by Harvard, the behavior will not occur. A woman may intend to go to a program, but her babysitter may not be available, so she must stay home rather than attend.

People may intend to do something, but out of force of habit do something else. A woman may intend to drive a new route to work, for example, yet find herself inexplicably taking the same route she has driven every day for the past year. A man may intend to stop drinking alcohol, but finds himself sipping a drink before dinner without even remembering having poured the drink.

Some behavior is complex and requires a great deal of advance planning and preparation. For example, to give a child a medication for an illness, a parent must make an appointment at a clinic, go to the clinic, obtain a prescription from a doctor, get the prescription filled, and then take the pills home and remember to give them to her child. If the probability of accomplishing any given step in this sequence is low, then the probability of the child using the medication is low, even though the mother had a strong initial intent to pursue this course of action.

Sometimes people forget to do things they intended to do. A woman may fully intend

to go to a parenting program, but simply forgets all about it.

Sometimes people lie about their true behavioral intent. In such cases, predictions based on their stated intent will be wrong because the person does not really intend to act in the stated way.

In sum, if we assume a truthful report of behavioral intent, a behavioral intention or behavioral decision will most likely predict behavior if (1) there is a short time interval between the assessment of intention and observation of behavior and (2) if the behavior is under the volitional control of the individual.

Implications for Intervention Design. The analysis of the behavioral intention and behavior link has non-trivial implications for intervention design. Often, interventions try to convince people to enact or avoid performing a behavior. However, some people may already have decided to behave in a way that is consistent with program goals, yet they still fail to perform the desired behavior. Their failure results not from lack of intent or desire, but from one or more factors that prevent them from translating their intention into behavior. In such cases, the focus of the program should be on determining and addressing factors that prevent the translation of intentions into behavior rather than trying to convince the people to do something they already have decided to do. Good program design begins with a careful analysis of the relationship between intended behavior and actual behavior and factors that impede the translation of decisions into behavior.

Our framework formalizes the above by identifying four general classes of variables that can impede/facilitate the relationship between intentions and behavior. These appear in Figure 1, and we briefly describe each, in turn:

Environmental Constraints and Facilitators. Environmental constraints are features of the environment that prevent people from carrying out their intentions. They include such obstacles as lack of availability, bureaucratic requirements, uncooperative others, and dependence on other people or events. This class of variables does not refer to perceived obstacles to behavior (which we consider later)—it refers to actual obstacles and constraints. Environmental facilitators are features of the environment that encourage people to carry out their intentions, such as a persistent friend who insists on the woman attending a program.

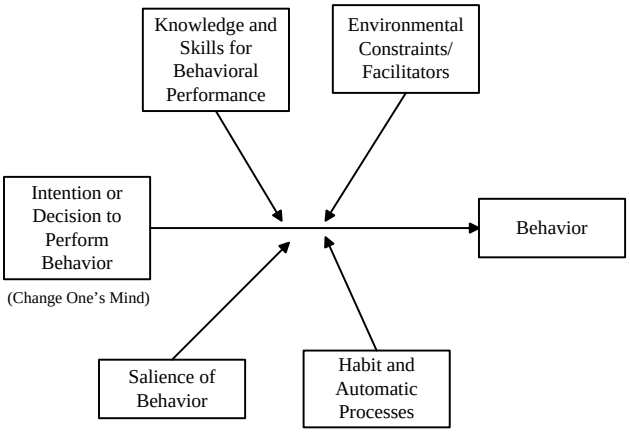

FIGURE 1. Moderators of the Intention-Behavior Relationship

Knowledge and Skills for Behavioral Performance. In order to perform a behavior, there may be knowledge and skills that are necessary to enact that behavior. For example, skills to help one overcome procrastination may be important so that people do not keep delaying behaviors that are important to perform sooner rather than later. Certain coping skills may be necessary for a person to resist environmental pressures to behave in ways s/he would rather not. Emotion regulation skills may be needed to help a person deal with negative emotions that may lead the person to change his or her mind at the last minute.

Salience of the Behavior. Variables in this category derive from what social scientists call "cues to action." An intention to act may not translate into behavior unless that intention is made salient to individuals and is accessible to memory. People may forget to do things they intended to do unless they are reminded or unless cues in the environment spur them to action.

Habit and Automatic Processes. Sometimes people behave in ways that are outside their conscious awareness. In such situations, automatic processes take hold and guide their actions. Sometimes by force of habit, people do things they do not intend to do.

In sum, it is not enough to convince people to perform a behavior. Even the best of intentions may not translate into behavior. When thinking about a specific behavior in a given population to change, we have found it helpful to consider the possibility that some people fully intend to perform the behavior but for some reason do not (or, conversely, do

not intend to perform the behavior but end up doing so anyway). In analyzing what short-circuits the connection between intention and behavior, we find it useful to ask five questions based on the four categories of Figure 1:

1. What environmental obstacles and constraints prevent people from translating their intentions into behavior? What facilitators in the environment help people translate their intentions into behavior?

2. What knowledge and skills must people have in order to perform the behavior they intend to perform (or not to perform the behavior they do not want to perform)?

3. What cues to action can be put into place, and what reminders can be used to make a behavior salient?

4. What habits and automatic processes might lead people to behave in ways counter to their intentions?

5. What might lead people to change their minds at the last minute and decide not to do what they originally intended to do?

Behavior Specific Determinants of Behavioral Intentions

Just as important as the question of how intentions translate into behavior is the question of where intentions come from. What makes some people intend to perform a behavior and others not? What are the bases of strong versus weak intentions to perform a behavior?

Our framework identifies five classes of variables that determine intentions: (1) behavioral beliefs or expectancies, (2) normative beliefs, (3) self-concept/social images, (4) affect/emotions, and (5) self-efficacy. These variables represent a synthesis of constructs from the classic Reasoned Action Model (Fishbein & Ajzen, 2010), the Health Belief Model (Janz & Becker, 1984; Rosenstock, Strecher & Becker, 1988), social learning theory (Bandura, 1986), theories of subjective culture (Triandis, 1972), and emotion regulation theories (Gross, 2007) and are depicted in the influence diagram in Figure 2. To be sure, each of these theoretical traditions disagree about how the various categories should be conceptualized, measured, and causally prioritized, but all agree that the construct categories are potentially relevant in one capacity or another. We discuss each category, in turn.

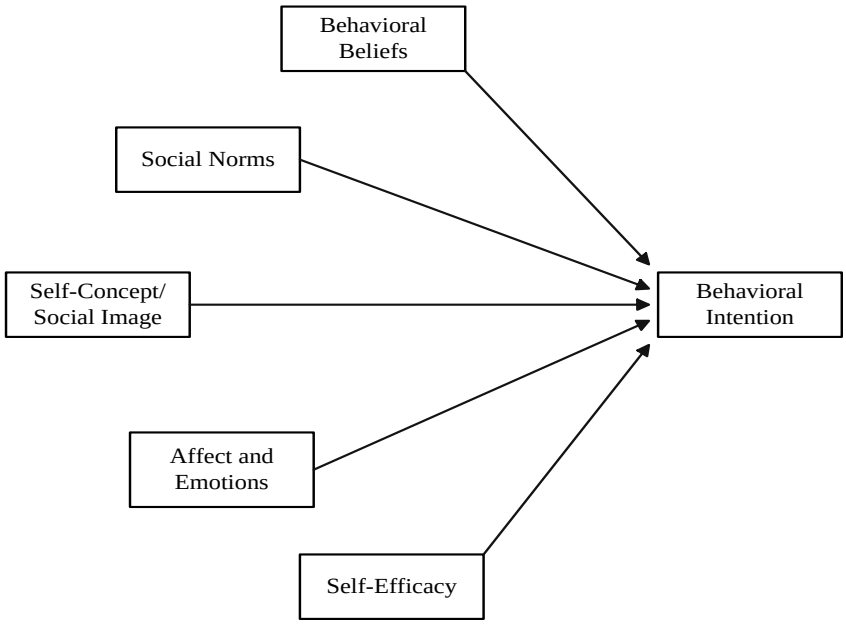

FIGURE 2. Determinants of Behavioral Intentions

Behavioral Beliefs. Behavioral beliefs are the advantages and disadvantages that people associate with a behavior. People typically perceive multiple advantages and disadvantages of performing a behavior. An adolescent might think, for example, that engaging in sexual intercourse will make her boyfriend love her more, that it will make her feel more grown-up, that it might give her a bad reputation, and that it would be immoral. The net effect of such perceptions is an overall favorable or unfavorable judgment, or attitude, about having sex. In general, if people perceive a behavior as having many advantages and few disadvantages, they generally intend to perform it. If they perceive the behavior as having many disadvantages and few advantages, they generally intend not to perform it. If they perceive the behavior as having about equal advantages and disadvantages, they will be ambivalent about performing that behavior. An important part of intervention design is to conduct empirical research that provides insights into what the relevant perceived advantages and disadvantages are for the behaviors we target.

Social Norms. Regardless of perceived advantages and disadvantages, a person might perform (or not perform) a behavior because of social norms—that is, the pressure s/he experiences to conform to a standard of behavior. Our framework distinguishes between two types of normative pressure, injunctive norms and descriptive norms. Injunctive norms refer

to how the people who are important to the individual feel about his or her performing the behavior—that is, whether they approve or disapprove of it. In general, if the people who are important disapprove, the individual will not intend to perform the behavior. If they approve, the individual will intend to perform it (though, as we note later, the person may ignore the wishes of others). Descriptive norms refer to how many of his or her peers a person thinks perform the behavior. For example, an adolescent might think that few of his or her circle of friends have used drugs and this may make him or her less inclined to do so. A person may decide to perform a behavior because the people who are important to that person think he or she should perform it (injunctive norms), because "everyone is doing it" (descriptive norms), or for both reasons. Indeed, such norms may override any influence of behavioral beliefs and completely determine one's intentions.

Self-Efficacy. The extent to which people feel they can be successful at performing a behavior, should they try to do so, reflects self-efficacy—and it also plays into their decision about performing that behavior. If people do not think they can do something, they will not bother trying.

In making judgments about self-efficacy, a person considers the obstacles to performing a behavior and his or her ability to overcome those obstacles. The final judgment regarding likely success in enacting the behavior is some function of these perceptions. This overall judgment of self-efficacy can, in turn, influence whether the person decides to perform the behavior. For example, an obstacle to communicating with one's child is finding the right time and place to do so. If a parent does not think s/he can do so, s/he may not even try, even though s/he has favorable behavioral beliefs about it and even though important others think she should.

Self-Concept and Social Image. Some people are concerned about the image they will convey to others if they perform an action. They may be concerned about the stigma associated with performing the behavior, as well as how what they do fits with their conception of themselves. The implications of a behavior for the social image people want to project and its congruity with their self-image can influence their decisions. If people think a certain behavior will convey a negative image to others, they may not want to perform it. If they think a behavior will convey a positive image to others, then they may decide to perform the behavior. There is a large body of research on social prototypes that affirms the utility of taking into account image based considerations when trying to understand behavioral decisions (Gerrard, Gibbons, Houlihan, Stock & Pomery, 2008).

Self-concept and social image are conceptually related to norms because they represent

aspects of behavior that are motivated by social considerations. But social scientists have found image beliefs to be distinct from norms and to be sufficiently prevalent to deserve distinct consideration (Gerrard et al., 2008).

Emotions and Affect. Many of the variables discussed above are cognitive in nature, yet people often decide to do things based on their emotional reactions to them. Emotions are typically viewed as distinct from moods and other more stable affective states, such as depression and anxiety. Emotions tend to be more intense and more short-lived. In general, individuals who have a strong negative emotional reaction to performing a behavior will be less inclined to perform that behavior, and those who have a strong positive emotional reaction to performing a behavior will be more inclined to perform that behavior. Those who feel a mix of emotions will have more ambivalent feelings toward performing the behavior.

In sum, when analyzing why people decide to perform or not perform a behavior, we find it useful to ask the following questions:

6. What do people see as the advantages and disadvantages of performing the behavior?

7. What are the normative pressures to perform the behavior, including whether important others approve or disapprove of their actions and what their peers are doing?

8. How do people judge their ability to perform the behavior and what obstacles do they think stand in the way to impede behavioral performance?

9. What kind of social images do people think they will project if they perform the behavior and how does this image fit with their own self-concept?

10. How does performing the behavior "feel" to people, emotionally and affectively? What are the relevant affective states that govern behavior?

Not all of these factors are taken into account by people when they make decisions. Some decisions will be determined solely by emotion, others solely by what important others think, and still others by a combination of factors. Sometimes all of the classes of variables will push a person in the same direction with respect to behavior, while at other times they will be in conflict: A person might see many advantages of performing a behavior but also experience strong normative pressures not to do it. Figure 2 implies a simple additive

function among the determinants when, in reality, the joint influence is likely to be complex and interactive.

When designing an intervention aimed at influencing an adolescent behavior or a parent behavior, we engage in extensive pre-intervention analyses of that behavior to answer the 10 fundamental questions outlined above for it. If we need to help people carry though with their behavioral decisions, odds are that the answers to questions 1-5 will be helpful. If we need to change or strengthen a person's intention to perform a behavior, odds are that the answers to questions 6-10 will be helpful.

Hundreds of studies have been conducted on the variable classes described above, and each category of variables has a rich empirical base in the social sciences. Other variables may have an independent effect on decisions, but the variables considered above will undoubtedly account for substantial portions of the variability in many of the decisions people make and the kinds of behavior they undertake. As we try to understand the behavior of adolescents and parents so we can determine which constructs to target in our interventions, focusing on the categories of variables described above in pre-intervention research yields substantial returns.

AN EXAMPLE OF A PARENT BASED INTERVENTION

To illustrate the utility of designing a parent based intervention using the above framework, we briefly describe research we conducted to help us design an intervention to prevent the early initiation of sexual intercourse in middle school youth (aged 11 and 12). As background, we first describe the intervention as well as an empirical study we conducted to evaluate its effectiveness (Guilamo-Ramos et al., 2011a). We then describe two pre-intervention studies we conducted that informed the content and structure of the intervention.

The intervention used a novel outreach mechanism in that it was delivered in a primary healthcare clinic in a poor inner-city setting to parents when adolescents visited their physician for a physical examination, usually to enroll in school for the coming academic year as required by school districts. In such scenarios, it is not atypical for mothers to wait up to 30 or 45 minutes in the waiting room while their adolescent child is having his or her physical with the medical staff. We felt this was a perfect opportunity to outreach to parents as they generally were doing little more than passing time. Mothers were approached by a social work interventionist and asked if she would participate in a program to help her talk

with her child about teen pregnancy and sex. Upon agreement, the mother was taken to a private room and administered the intervention. At the conclusion of the intervention session, the mother was given reference materials and specific activities to engage in that would facilitate discussions about sex with her adolescent. During the exam, the physician told the adolescents (in the treatment condition) about the program the mother was participating in and endorsed it to the adolescent. This also was reinforced when the physician debriefed the mother and adolescent together in terms of the results of the physical. For control group families, the entire protocol was treatment as usual (TAU) with no intervention.

All mothers assigned to the intervention condition received two booster calls. The first booster call occurred one month after the intervention, and the second at five months post-intervention. The purpose of the booster calls was to determine if the mother had reviewed the intervention materials and implemented the materials and activities with her adolescent child. During the booster calls, the social work interventionist answered any questions the mother had with respect to the material, and encouraged the mother to work with the materials. Booster calls were not made for mothers assigned to the control condition to mimic "standard care" protocol. The booster calls were short and straightforward and served mainly as a "reminder" or "cue to action" for the mother (see Figure 1).

Adolescents were interviewed at nine months after baseline to measure their sexual activities. Responses to the interviews were made under conditions of complete confidentiality and adolescents never had to report their behaviors face-to-face to another individual, i.e., they answered questions on a self administered questionnaire. The primary outcome variable was whether the adolescent had engaged in sexual intercourse and of primary interest was the disparity in rates of sexual intercourse between the treatment and control groups.

The intervention consisted of four components. The first was the face-to-face session between the social work interventionist and the mother, which lasted about 30 minutes. The second component was a written guide that taught parents effective communication and parenting strategies for reducing adolescent sexual risk behavior. The guide consisted of nine modules addressing topics such as adolescent development and self-esteem, parental monitoring and supervision, parental discipline strategies, parental self-efficacy to communicate, general parenting strategies associated with reduced sexual risk-taking, ways to improve the parent-adolescent relationship and communication, adolescent assertiveness skills and techniques for dealing with peer pressure, adolescent sexual behavior, the health

consequences associated with adolescent sexual risk taking, and birth control and STI protection. The contents of these modules were heavily impacted by empirical results of studies on these topics in our broader research program.

We also gave parents two communication aids that they could use to engage their adolescents. One was a short booklet that we prepared that was to be given to the adolescent. The parent gave the booklet to the adolescent and used it as a basis for discussion. The booklet addressed key issues identified in our previous research as relevant for preventing sexual intercourse in adolescents. The other communication aid was a short story that parents could ask their adolescent to read. The parent could then start a conversation about the story. The story described four adolescents who make different decisions about having sex and the consequences of those decisions.

The 30-minute intervention was primarily devoted to how to effectively use these materials and how to structure conversations with their adolescents so as to impact factors that our research has found to be important but that parents rarely address, as described below.

The third component of the intervention was the booster sessions. The fourth component of the intervention was the physician endorsement of the intervention to the mother and adolescent.

The intervention evaluation study was conducted with 271 Latino and African American families, about half of whom were randomly assigned to the control condition and half to the intervention condition. Notable features of this study include (a) the use of an outreach approach that permits access to large numbers of parents in real world settings and (b) the brevity of the intervention (a single 30-minute face-to-face interaction with parents). The primary cost of the intervention in real life settings is the need for a trained social work interventionist and someone to make the booster calls. In poor, inner city settings, it is typical for most neighborhood residents to use a single, large health center (which is why our outreach strategy was viable). To reduce the costs associated with hiring an interventionist and (booster call) staff, we rely on interns from social work programs at universities in the surrounding city. Social work programs place MSW students in internships to provide them with field experience. By building a relationship between the university and health centers, interns can be placed in the clinics at low cost and in a way that the interns gain invaluable experience. Everybody wins.

An example of how the aforementioned theory helped to shape our intervention strategy is illustrated with reference to a study we conducted that focused on behavioral

beliefs associated with adolescent decisions to engage in sexual intercourse (Guilamo-Ramos, Jaccard, Dittus, Bouris, Holloway & Casillas, 2007). In addition, we drew upon results of a study we conducted on parent-adolescent communication about sex (Guilamo-Ramos, Dittus, Jaccard, Goldberg, Casillas & Bouris, 2007a). In the former study, we found that adolescent decisions to engage in sexual intercourse were most strongly associated with the perceived short term positive consequences of doing so (e.g., having sex would make me feel closer to my boyfriend/girlfriend, it would make me more popular, it would make me feel more attractive, it would make my boyfriend/girlfriend like me better, it would feel good). We also found in this study that behavioral beliefs surrounding health and pregnancy concerns (contracting HIV, STIs, and experiencing an unintended pregnancy) were only weakly associated with adolescent decisions to engage in sex, suggesting that such considerations are not of central relevance to adolescent decisions to have sex. In the communication study, we found that parents tended to talk most with their adolescents about pregnancy and health concerns, primarily because parents were concerned with the health and pregnancy consequences of early sex for their child. Parents rarely addressed short term positive consequences in their conversations and, in essence, were emphasizing the wrong topics in terms of the types of behavioral beliefs that were the basis of adolescent decisions. While parents tended to focus on the long-term negative consequences of engaging in the behavior when talking with their adolescents, our research indicated that it was adolescent perceptions of the short-term positive consequences of the behavior that had the biggest impact on their decisions to have sex.

Armed with this knowledge, the intervention was framed to parents around the heuristic "think health, talk social," with "think health" being designed to motivate the parent to talk with their child about not engaging in sexual intercourse (because our research found the prospects of STIs, HIV, and pregnancy to be a primary motivator for parents talking with their children about sex) and the latter "talk social" to encourage parents to address factors we knew based on empirics were important to address. We then taught the parents, among other things, effective communication strategies for talking about the short term positive consequences of engaging in sex with their adolescent child in ways that would help the child put these in proper perspective and negate their impact. Examples of the intervention materials can be found at www.clafh.org/resources-for-parents/parent-materials/.

The data as measured at 9 months post baseline in the intervention study were supportive of our approach. The percentage of adolescents who reported having engaged in

vaginal sexual intercourse in both the intervention and control conditions at baseline was 6%. Nine months later, the percentage of adolescents reporting that they had engaged in vaginal sexual intercourse remained at 6% in the intervention condition, but increased to 22% in the control condition, a statistically significant ($p < 0.05$) difference. We also found statistically significant differences in the frequency of sexual intercourse in accord with our predictions. It was not possible to evaluate the effects of the intervention on condom use because the base rates of sexual activity in the intervention condition subsequent to the intervention did not produce a sufficient number of cases to examine this meaningfully. The intervention was too effective at preventing sexual intercourse to evaluate condom use during acts of sexual intercourse.

Not every parent-based intervention we have designed to impact adolescent problem behaviors has been this successful, but each of them has had statistically significant and non-trivial effects on the target adolescent problem behaviors we addressed (e.g., tobacco use, binge drinking, sexual risk behavior). Strong theory coupled with careful preparatory empirical work makes a difference.

NEW DIRECTIONS FOR BEHAVIORAL THEORY: SPLIT SECOND DECISION MAKING

Although the above theoretical framework for analyzing behavior has proven to be useful for intervention design, we believe that the approach can be improved by expanding the behavioral theory to incorporate perspectives from a substantive area that we refer to as "split-second decision making." This section elaborates these research directions (for other theoretical innovations that can be useful, see Jaccard, 2012).

Traditionally, predictors such as those in Figure 2 (behavioral beliefs, norms, social prototypes, emotions and efficacy) are measured in a survey and then used to predict behavior that occurs at some point in the future. In some respects, such an approach asks people in a context-sanitized questionnaire to think about behaviors outside of the rich contexts in which they are embedded. We might ask an adolescent, for example, if he intends to use condoms the next time he has sex and then what he sees as the advantages and disadvantages of doing so, the normative pressures he might experience to do so, and so on. However, it probably is difficult for the adolescent to anticipate and take into account all the parameters of that future context that will be operating when the "split second" decision is made at the start of having sex to either use condoms or to have unsafe sex. Many behaviors

of interest to social scientists are the product of such split-second, last moment decisions, even behaviors that might appear to be relatively stable and thoughtful. The behavior of getting an HIV test, for example, may be initiated by a careful, deliberated decision process that leads the individual to arrange a test, but until the person walks through the health center door and makes the split-second decision at the final moment to go through with the test, the initial decision has the potential to be undermined. Indeed, our research on HIV testing has found that a substantial number of individuals who enter a clinic to obtain an HIV test often leave as the anxiety associated with possibly obtaining a positive result becomes ever more salient, leading them to change their minds at the last second (Wilson, Jaccard, Endias & Minkoff, 1996). Even a behavior as obviously thoughtful as applying for admission to a college is not finalized until, for example, the split second decision is made to press the "submit" button on an online application for the college. These examples underscore the importance of understanding and addressing such split second decisions. Responses to a questionnaire about classes of predictor variables (such as those presented in Figure 2) assessed days, weeks, or months prior to such moments using a context sanitized description of events does not, in our opinion, seem to be an optimal way of understanding these split second decisions.

Two Appraisal Systems in Split Second Decision Making

Cognitive scientists distinguish two appraisal systems that operate in any given situation (Gross, 2007; Smith & Kirby, 2000). The first is a cognitive appraisal system, where we interpret the situation we are in, make note of who is present, think about what people's intentions and orientations are who are present, and formulate other cognitions about the setting and context. The second system is an affective appraisal system that alerts us to the emotions, feelings and affective reactions that we are having and that, in turn, may predispose us to act or interpret matters in certain ways. There is considerable neuroscience data to support the existence of these two appraisal systems (Larsen, Bernston, Poehlmann, Ito & Cacioppo, 2000; Squire, Stark and Clark, 2004). Such cognitive and emotional appraisals in situations happen at lightening fast speeds, often automatically, and sometimes without awareness. These appraisals form the basis of many split second decisions.

Cognitive Appraisals and Four Memory Systems

Cognitive appraisals are rooted in memory systems. Memory is a record of experience

represented in the brain, while learning is the process by which memories are obtained. Memories are based on changes in synaptic connections within neural circuits in different regions of the brain (Squire, 2004). Theories of the structure of memory abound and there is controversy about each theoretical representation (Brown, Neath & Chater, 2007). Classic theories distinguish between sensory memory, short term memory, working memory, and long term memory. We briefly discuss these four types of memory systems in order to lay a foundation for better understanding the split second decisions that people often make.

Memory System1: Sensory Memory. At any given point in time, the surrounding environment is taken in by sensory receptors and processed by the nervous system. Sensory memory refers to the fact that people retain momentary impressions of the sensory information that lasts for micro-seconds after the original stimulus has ceased. Sensory memory is thought to operate outside of cognitive control (Winkler & Cowan, 2005). It contains an immense amount of detail resulting in very high resolution information. Once a sensory memory trace has decayed or is replaced by a new memory, the information stored is lost. Sensory memory is not involved in higher cognitive functions, such as consolidation of memory traces or comparison of information (Dick, 1974). Sensory memory provides a smooth stream of information to the brain, some of which is extracted by working memory for consolidation into more stable and interpretational forms. An interesting question is what information from sensory memory gets extracted into working memory and why. Our prior memories, goals and motives play a role in this process.

Memory Systems 2 and 3: Short Term and Working Memory. Short term and working memory are characterized differently by various theories, but it is generally acknowledged that the two memory systems are distinct. Short-term memory refers to the short-term storage of information and does not entail the manipulation of material in memory. Working memory refers to processes used for manipulating and elaborating information that is conscious, i.e., information that is in short term memory. Together, short term and working memory produce the thoughts that are "in your mind" at any given time, though unconscious memories also may be used in working memory.

Working memory reflects the holding of information in the mind needed for tasks, like reasoning and comprehension. The cognitive processes used by working memory include attention, control of short-term memory, and encoding, integration, processing, and retrieval of information.

Short term memory can store information for about 10 seconds without rehearsal while working memory processes, manipulates, and controls it (Miller, 2003). Unless acted upon

by working memory, information in short term memory decays rapidly and its impact on decisions is limited accordingly. It is difficult to specify the capacity of short term/working memory, but Miller's classic work suggests it is 7 bits of information, ± 2 (Miller, 1956). More recent work suggests the limit may be lower, while others have argued that it is impossible to know because of phenomena like information chunking (e.g., where the numbers 1, 2, 3 are chunked into 123; Miller, 2003). Despite this, it is safe to say that the amount of information that people can keep in their conscious mind is time sensitive and limited and that Miller's 7 ±2 is a rough guideline for appreciating the limits of conscious information processing. Working memory is the "workhorse" for split second decision making because it processes, manipulates, augments and defines information in conscious awareness, drawing not only on information from the external environment that has entered short term memory from sensory memory but also information extracted from long term memory that is then used to help interpret the environment and guide actions.

Memory System 4: Long term memory. Long term memory is our permanent storehouse of memories across a large, distributed network of areas in the brain. Scientists characterize facets of long term memory in different ways. Declarative memory is memory for facts. A variant of this is episodic memory which is the memory of specific past episodes. Semantic memory or rule based memory is memory for rules or principles that summarize regularities, such as the rule "I have sex about twice a week" or "I use condoms whenever I have sex." Procedural memory (also called implicit memory) is memory for procedures, such as driving a car. Emotional memory is the attachment of affect to stimuli and events.

How information and knowledge held in long term memory is organized is controversial. One influential set of theories argues that complex associational networks represented by pathways of varying strength link constructs. Once a node in the network is activated (by the individual thinking about it vis-à-vis working memory), the activation is spread to surrounding nodes connected to the original node. When the original node is deactivated (i.e., no longer thought about), the activation of surrounding nodes dissipates. Such spreading activation models have difficulty accounting for emotional influences on memory and have been expanded to include affective mechanisms in conjunction with spreading activation (Parrot & Spackman, 2000).

The above four systems of memory are key to the cognitive (and affective) appraisals we make in a given situation. Sensory memory reflects information in the surrounding environment, elements of which work their way into short term memory for processing and manipulation by working memory. Working memory also draws upon information in long

term memory to formulate actions and plans on the part of the individual. All of this happens at lightening fast speeds, with some activities being under the cognitive control of the individual but others not. To understand split second decision making, we need to understand the dynamics of the four memory systems.

Affective Appraisals and Emotion Regulation

Interestingly, affect and emotions have relatively minor theoretical roles in many of the dominant social-cognitive models of adolescent problem behavior, which is surprising given the substantial literature on emotions and emotion regulation in adolescent development. We know from a wide range of research that the cognitive appraisals people make shape the emotions they experience, and in turn that emotions impact the kinds of cognitive appraisals one makes. For example, emotional arousal causes the release of glucocorticoids that influence memory fixations (McGaugh, Cahill & Roozendaal, 1996). Negative moods increase the perceived likelihood of negative outcomes and positive moods can increase the perceived likelihood of positive outcomes (Wyer, 2007). People who are in positive moods often engage in "mood maintenance" through enhanced aversion to consequences that impinge on it (Parrot & Spackman, 2000). In the decision literature, loss aversion refers to the phenomenon that people usually view the pain of giving up a desirable outcome as being greater than the pleasure of obtaining it (Shrafir, 2007). Lazurus' research on affective appraisal has identified cognitions associated with distinct emotional reactions (Kruglanski & Higgins, 2005; Scherer, 2001). All of this research suggests the importance of emotions and affective appraisals in split second decision contexts.

Current emotion regulation theory emphasizes five regulation strategies that people can use to control emotions that result from affective appraisals (Shrafir, 2007), (1) situation selection, which is avoiding situations where unsafe behavior is likely to take place, (2) situation modification, which is modifying the situation so as to alter its emotional impact, (3) attentional deployment, which is directing attention to deal with emotions, such as through distraction or concentration, (4) cognitive change, which is changing how one thinks about the situation, and (5) response modulation, which is controlling physiological or experiential responses, such as by using drugs, relaxation techniques, and/or channeling emotions into adaptive response alternatives. As elaborated below, we believe that using variants of these strategies in interventions coupled with procedures that influence the contents of working memory in split second decision making scenarios can substantially advance the effectiveness of our interventions to address adolescent problem behaviors.

Social Psychological Models of Behavior and Split Second Decision Making

Not only do none of the dominant social-cognitive theories of behavior (e.g., Fishbein and Ajzen's reasoned action model (Fishbein & Ajzen, 2010); the stages of change model (Prochaska & DiClemente, 1984; social learning theory (Bandura, 1986)) meaningfully incorporate emotion constructs into their frameworks, many of them also fail to address the four memory systems in their analyses of behavioral decision making. Based on the cognitive and affective appraisals being made in a given situation where action is being contemplated, we believe that it is likely that different components of the model in Figure 2 enter short term and working memory, which, in turn, leads people to act in certain ways. However due to the limited capacities of working memory, it is unlikely that all the constructs measured in a typical study of adolescent decision making (e.g., multiple behavioral beliefs, norms, efficacy beliefs, social prototypes, emotions) enter working memory at a given point. Rather, some subset of the constructs enter working memory and then exert influence on the decision. For example, a slightly inebriated woman who is being "hit on" by a moderately inebriated attractive male at a party may be asked by that man to go to his apartment. The thoughts that enter her working memory as she makes her split second decision might be a behavioral belief ("The guy might end up being too aggressive and hurtful"), a normative belief ("My mother would kill me!), a control belief ("I really can't do this even if I wanted"), some combination of them, or a psychological "summary" of a category in the form of an attitude or generalized subjective norm (Fishbein & Ajzen, 2010) . But it is what becomes salient at that given instant that is likely to heavily impact the woman's behavior.

In such settings, two types of cognitions can become activated in working memory. One type of cognition is fairly stable, generalized cognitions that the person has learned from past experiences, conversations with others, and/or educational campaigns. For lack of a better term, we call these chronic cognitions. Examples are "If I have unprotected sex, I could get an STD," and "My mother really would not approve of this." Such cognitions are what interventions traditionally target to change the degree of belief in them. The other type of cognition that can become salient in working memory is situation specific cognitions that are tied to the immediate context ("That guy is pretty hot and I would not mind getting him as a boyfriend"). We refer to these as situation constructed cognitions. Both chronic cognitions and situation constructed cognitions can enter working memory and impact decisions. Practical constraints limit researchers' ability to measure situation constructed cognitions and to identify which factors of the model in Figure 2 enter working memory in a

given situation. This challenge probably is one reason why theorists have avoided this line of work. Later we describe methods of study that we believe can help one appreciate the contents of working memory in specific situations. But even without such methods, we must recognize that split second dynamics operate in many contexts and this, in turn, can shape how we structure our interventions. It is not enough to change cognitions in abstract intervention settings. We must also impact how cognitions and emotions become salient and are used in working memory in high risk situations.

Models like those of Figure 2 give a rich accounting of the types of cognitions that might become salient in working memory in a given situation. But they tell us little about which cognitions actually enter working memory in different situations. In promoting healthy decisions, we want to ensure that the "right" kinds of cognitions enter working memory and impact decisions.

The above logic suggests a somewhat different intervention strategy than what is typically pursued for interventions on adolescent risk behavior. In traditional interventions, interventionists seek to change the degree of belief in chronic cognitions or strengthen chronic attitudes so that they are more consistent with healthy behavior. Such efforts are important and we are not suggesting here to abandon them. In the split second decision framework, the focus turns to influencing the salience of cognitions and emotions to ensure that health promoting cognitions and emotions enter working memory in risky situations when split second decisions are made. It is not enough to have a strong cognition or emotion supportive of condom use, for example, if that cognition or emotion fails to enter working memory at the right time. In the split second decision making approach, we augment traditional approaches by focusing on (1) strengthening associations between cues in high risk situations and health promoting cognitions/emotions so the associated memory nodes will be activated in working memory when the cues are later encountered. The framework also (2) identifies high risk situations for individuals, highlighting key cues in those situations that will signal the risk nature of the situation. In this way, individuals will make conscious note in working memory of those situations as being high risk when they are encountered. It also (3) encourages individuals to avoid those situations, (4) identifies for people the types of cognitions and feelings they may have in those situations, (5) introduces new cognitions and reactions for those situations that will (hopefully) dominate working memory, and (6) provides individuals action and emotion regulation strategies they can enact in the situations to prevent them from engaging in unhealthy behaviors.

Our qualitative research with adolescents has found, time and again, instances where

adolescents are caught off guard in situations where they are suddenly confronted with an opportunity to perform a risk behavior. Despite their prior intent not to perform the behavior, they act on the basis of split second dynamics and end up doing something they otherwise would not. As an example, consider the case of Pedro, a sixth grader who recounted how he started smoking cigarettes. Pedro had never smoked and had no intention of smoking. All of the predictors in Figure 2 were "aligned" for Pedro to not smoke cigarettes. Pedro had always admired a small group of eight graders and desperately wanted to hang out with them. But because he was a "lowly" sixth grader, such was not to be. One day while walking home from school a group of four of the eight graders called out to Pedro and said "come walk with us." Pedro was thrilled. As they were walking, one of the eight graders took out a cigarette, lit it up, took a puff, and then passed it to the boy walking next to him. The second boy took a puff and passed it to the boy next to Pedro. Pedro quickly realized what was going to happen, as he was last in line and the cigarette was working its way toward him. He started thinking "should I take a drag or not?" He then recounted a number of behavioral and normative beliefs that raced through his mind as the cigarette worked its way towards him and in the final split-second when the cigarette was handed to him, Pedro decided to take a puff because he really wanted to impress the others and he thought not doing so would make him look foolish. Such was the start of Pedro's smoking habit.

Now imagine if Pedro had been forewarned about such scenarios and had been told about the kinds of thoughts and feelings he would have. Imagine that Pedro had been told that his first reaction in dealing with the situation should be to affirm to himself his intention not to smoke cigarettes. Finally, imagine if Pedro had been given some strategies for not taking a hit without looking foolish. Perhaps the outcome would have been different.

Intervention Tools that are Consistent with the Split Second Decision Making Framework

Split second decision making dynamics suggest that new approaches are needed to intervention design that can directly confront last minute changes of mind based on the contents of working memory. As we try to impact the contents of working memory in high risk situations, methods other than those that produce changes in the degree of belief in chronic cognitions are necessary. Research suggests that active learning (learning through active participation) as opposed to passive learning (listening to a lecture) enhances

association strength in memory. Strategies that encourage image-based thinking also positively impact association strength, although imagery coupled with semantic encoding does even better (Parrott & Spackman, 2000). Thus, we need intervention tasks that use vivid representations of health promoting cognitions and emotions that build associations between cues in high risk situations and these cognitions-emotions. We suggest four strategies that are compatible with the split second decision making framework and that can be used to impact the contents of working memory in high risk situations.

If-Then Constructions. There is a sizeable research literature on the construct of "implementation intentions" that is consonant with the split-second decision making framework (Gollwitzer & Sheeran, 2006; Gollwitzer & Oettingen, 2011). The strategy focuses on people who have positive intent to perform a behavior in general (e.g., to use a condom), but who often fail to do so in specific situations. The strategy helps people carry out their general intentions by having them explicitly state and elaborate action plans of the form "If situation X occurs, then I will perform behavior Y," thereby linking a (high risk) situation to a desired behavioral action. This creates both an implicit and explicit commitment to respond to situational cues in a planned manner. For example, individuals might describe a situation in the past where they have engaged in unprotected sex and then verbalize a commitment to engage in safe sex if they encounter that situation in the future, describing at the same time how they would deal with obstacles in that situation that encourage them to respond otherwise.

Forming an implementation intention requires identifying situational cues in risk situations that become part of a person's mental representation of the situation (Gollwitzer,1999). People will then be in a better position to identify the situation as high risk and attend to it when it is subsequently encountered (Aarts, Dijksterhuis & Midden, 1999; Parks-Stamm, Gollwitzer & Oettingen, 2007; Webb & Sheeran, 2004). Studies have suggested that implementation intentions forge an association between the situational cues and the desired behavior (Webb & Sheeran, 2007), sometimes leading to an automated link that can operate outside conscious awareness. This feature makes the approach particularly well suited to influencing split second decisions in specific situations (Gollwitzer & Oettingen, 2011). Evidence also indicates that if-then planners act more quickly (Gollwitzer & Brandstatter, 1997), deal effectively with cognitive demands (Brandstatter, Lengfelder & Gollwitzer, 2001), and do not even need to consciously intend to act in a certain way at the critical moment (Sheeran, Webb & Gollwitzer, 2005). A meta-analysis by Gollwitzer and Sheeran (2006) involving over 8,000 participants in 94 independent studies reported an

effect size for the implementation intervention strategy of Cohen's d = .65 over and above strategies that rely on changing intentions alone. Research has shown that people who undertake if-then constructions more reliably start on their goals during inconvenient times and are more likely to protect the desired activity from getting derailed (Gollwitzer & Brandstatter, 1997). If-then planning helps individuals control intrusive thoughts and feelings (Gollwitzer & Schaal, 1998) and shields the individual from detrimental self-states (Webb & Sheeran, 2003) and adverse situational influences. We believe this promising but underutilized intervention strategy has considerable promise within the split second decision making framework (Gollwitzer & Oettingen, 2011).

Narrative Communications. The study of persuasion and attitude change has been dominated by the analysis of advocacy messages rather than narratives that tell stories and appeal to fictional or non-fictional accounts of characters. New research has emerged that explores attitude change using narrative accounts (Green & Brock, 2000; Hinyard & Kreuter, 2007). Narrative accounts rely on stories that raise questions, present conflicts, or depict not yet completed activity. Characters may encounter and then resolve a crisis. A story line, with a beginning, middle, and end, is directly identifiable. As such, attitude change is pursued through storytelling that evokes imagery, engages the reader in active processing in the context of the story, and that builds links between situational cues and cognitions, feelings, emotion regulation strategies and action plans. The persuasive influence of narratives is thought to derive from cognitive accessibility and affective processes, as such phenomena are more likely to come to mind than in non-narrative approaches. Narrative strategies are amenable to use in the split second decision making framework, especially given theories that suggest long term memory is often organized around story lines (Miller, 2003). Interestingly, even when narratives are fictional, they often lead to non-trivial belief and attitude change given that the contents are more memorable and respondents rarely "counterargue" themes in them as they become engaged in the story itself. Long, Winograd and Bridge (1989) reviewed research showing that producing mental imagery while reading improves comprehension and aids recall. They also show that text using descriptions of sensations and emotions, analogies and figurative language, and dramatic climaxes evoke imagery and often results in better recall. This literature suggests that interventions that make effective use of narratives for building associations between situational cues and cognitions/emotions is a potentially useful tool for intervention design.

Essay Writing. A change strategy that has a successful history in social psychology is that of having individuals write short essays in support of or opposed to a thesis. The classic

"counterattitudinal essay" used extensively in research on cognitive dissonance has proven to be an able change strategy as long as individuals do not feel too coerced into writing it (Leippe, & Eisenstadt, 1994, 1998; Cohen, 1962). Greenwald (1968) notes that such "self-persuasion" is more effective than listening to the arguments of others because its content becomes more salient, more personally relevant, and more memorable. The split second decision making framework strives to accomplish just that. It requires active information processing that produces both imagistic and semantic encoding of information. Having individuals write essays about how to deal with high risk situations also may be a potentially useful tool for intervention design,

Mental Contrasting. Another intervention strategy that is well suited to split second decision making frameworks is that of mental contrasting (Oettingen, 2000, 2012; Oettingen, Mayer, Sevincer, Stephens, Pak & Hagenah, 2009). In this approach, people are encouraged to image and fantasize about a positive goal that they would like to achieve in the future (losing weight; having a loving, romantic relationship) and then mentally contrast their images of that positive future with obstacles in their current realities that stand in the way of reaching that future. Oettingen (2012) casts mental contrasting into a broader theory of fantasy regulation and elaborates creative strategies for using fantasies and imagery as motivational tools that not only are memorable and resistant to negative feedback (Kappes, Oettingen & Pak, 2012; Kappes, Singmann & Oettingen, 2012), but that often operate through mechanisms of automaticity (see Figure 1) to impact goal directed behaviors. Oettingen (2012) elaborates important moderators of the effectiveness of mental contrasting, such as perceived likelihood of success, that also need to be addressed in interventions (see also Kappes, Wendt, Reinelt & Ottingen, 2013). Importantly, the approach has been integrated into the implementation intention framework so that the two approaches form a complementary, powerful intervention strategy, called MCII, to impact goal directed behaviors (Gollwitzer & Oettingen, 2011).

In sum, if-then constructions, the use of narrative communications that evoke imagery tied to high risk situations, essay writing about what is appropriate in high risk situations, and mental contrasting all represent potentially useful intervention strategies that fit well within the split-second decision making framework.

Research Methods that are Compatible with the Split Second Decision Making Framework

Split-second decision making frameworks also pose methodological challenges to social

scientists because they require that we gain perspectives on the contents of working memory in natural settings that are not easily accessible for measurement purposes. We describe here two methodological strategies that may be useful in this regard.

One approach uses in-depth interviews in conjunction with critical incident methodology (Kemppainen, 2000; Kemppainen, Levine, Mistal & Schmidgall, 2001; Leonard & Ross, 1997). This approach has been used to identify high risk situations, the key parameters of those situations and the thoughts that people recall having during them. The approach asks people to think vividly about the last time they were in a high risk situation (e.g., the person's last sexual encounter). Details of time, place, partner, activities, and situational circumstances are collected including the events leading up to the situation and events that ensued after it. Individuals report their thoughts, feelings and reactions as well as those they attribute to other individuals (e.g., their sexual partner). This approach, of course, is subject to recall bias and rationalization, but it can still yield insights into cognitions and emotions that may be relevant in a broader sense for intervention design.

A second methodological strategy uses "think aloud" protocols in the paradigm of Articulated Thoughts in Simulated Situations (ATSS) (Zanov & Davison, 2010). In this approach, the individual is an active participant in an imagined situation shown on a computer screen vis-a-vis realistic animation. The flow of the simulation is paused periodically (usually 5–8 times at 30 second intervals), during which time respondents articulate their thoughts at that point in time. The delay between the end of any given segment of the simulation and a prompt (usually an auditory signal) for them to think out loud is usually kept to a minimum to avoid disruption of the chain of thought. Ericsson and Simon (1984) and others (Lumley, 2005) argue that such think aloud methods are particularly sensitive to revealing the contents of short term and working memory given the limited time in which information is available in short term memory.

CONCLUDING COMMENTS

The effective design of parent-based interventions is complex and requires the careful use of social science theories that have strong empirical traditions. We have described one theoretical approach we rely heavily on to identify malleable determinants of the behavior of parents and adolescents to help us structure our interventions. The theory uses traditional concepts from popular social psychological models of behavior but also embraces emotion and emotion regulation constructs more so than many of these theories. Although we have

shown that effective interventions can be designed using such theories, we also believe that the theories can be enhanced to make interventions that much more effective. One fruitful direction is to bring to bear and appreciate the dynamics of split second decision making. Split-second decisions are far more common than people realize. At their core are cognitive and affective appraisal systems that impact the contents of four memory systems (a) sensory memory, (b) short term memory, (c) working memory and (d) long term memory. The split second decision making framework makes explicit the need to study both chronic as well as situation specific cognitions/emotions and how these interact with each other to impact last second decisions. With an emphasis on shaping what enters working memory in high risk situations, the approach requires novel intervention strategies to build associations between healthy cognitions/emotions and cues in high risk situations so that these cognitions/emotions enter working memory in those situations. Promising methods for doing so include if-then constructions, narrative communications, essay writing, and mental contrasting. Promising methods for studying the role of chronic and situation specific cognitions during split second decision making include critical incident methodology and Articulated Thoughts in Simulated Situations methodology. We are not suggesting that traditional approaches to behavior analysis based on theories like the Reasoned Action Model (Fishbein & Ajzen, 2010) be abandoned. To the contrary, we find these frameworks extremely useful. However, we also believe that recognition of split second decision dynamics can be used to build upon and improve these theories. We hope this chapter will encourage researchers to pursue research endeavors in this direction as they seek to construct brief, resource realistic, and effective interventions in real world settings.

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