



Published in final edited form as:

*AIDS Care*. 2011 June ; 23(6): 663–670. doi:10.1080/09540121.2010.532532.

## Theory development for HIV behavioral health: empirical validation of behavior health models specific to HIV risk

Dorian E. Traube\*, Ian W. Holloway, and Lana Smith

School of Social Work, University of Southern California, Los Angeles, USA

### Abstract

In the presence of numerous health behavior theories, it is difficult to determine which of the many theories is most precise in explaining health-related behavior. New models continue to be introduced to the field, despite already existing disparity, overlap, and lack of unification among health promotion theories. This paper will provide an overview of current arguments and frameworks for testing and developing a comprehensive set of health behavior theories. In addition, the authors make a unique contribution to the HIV health behavior theory literature by moving beyond current health behavior theory critiques to argue that one of the field's preexisting, but less popular theories, Social Action Theory (SAT), offers a pragmatic and broad framework to address many of the accuracy issues within HIV health behavior theory. The authors conclude this article by offering a comprehensive plan for validating model accuracy, variable influence, and behavioral applicability of SAT.

### Keywords

behavioral theory; empirical validation; HIV theory; Social Action Theory

### Introduction

In this third decade of the HIV pandemic, it is well established that HIV-risk behaviors must be understood within the context of other health concerns (e.g., anxiety, substance abuse, childhood sexual abuse), population-specific factors (e.g., the coming out process, gay-related stress), and other theoretical factors (e.g., intentions to practice safe sex) (Rosario, Schrimshaw, & Hunter, 2006). Theories of risk behavior must be responsive to the environmental, developmental, and social/interpersonal contexts of people's lives. Thus, HIV researchers need to be able to apply advances and critiques in behavioral health theory in order to translate theories for HIV prevention that developmentally and contextually shape risk-taking behaviors.

While there is a substantial amount of research occurring in the field of health promotion, Noar and Zimmerman (2005) have pointed out that true progression in the field has been hindered by a failure to integrate findings including model accuracy, variable influence, or behavioral applicability, into the substantive cumulative knowledge of the field. Critiques by other researchers in the field of health behavior research also highlight a need for careful consideration of how theoretical models are developed and tested (Home & Weinman, 1998; Ogden, 2003; Smedslund, 2000; Weinstein, 1993; Zimmerman & Vernberg, 1994). As previously stated, theoretically informed interventions are crucial to the field of HIV

prevention. Likewise, theories must reflect the latest advances in prevention practice. Validating models for accuracy, variable influence, and behavioral applicability facilitates HIV-prevention researchers in quickly and efficiently applying empirical results from prevention practice to theoretical frameworks that inform health outcomes.

Three main problems continue to perpetuate the lack of progression in both behavioral health theory and HIV-related behavioral research: (1) a large number of competing health theories; (2) the primacy of a few select theories in the absence of empirical evidence of their success in predicting behavior (Noar & Zimmerman, 2005; Ogden, 2003; Weinstein, 2007); and (3) the improper translation of behavioral health risk theory to disparate populations. The National Institute of Mental Health (NIMH) has noted that hundreds of funded studies on health-related behaviors continually rely on a small set of influential theories in social and health psychology (Fishbein et al., 2001). Inappropriately selecting theories in research and interventions can have ramifications to study outcomes including lack of translatability, lack of innovation, and misappropriation of statistical variance.

Given the sheer number of theories to test, it is imperative that HIV researchers carefully evaluate existing models for their strengths and weaknesses before choosing a theoretical model on which to base their work. HIV researchers can further benefit from understanding and applying advances and critiques in behavioral health theory to help target and translate theories for HIV research and intervention that are developmentally and environmentally appropriate. This paper will provide an overview of current arguments and recommendations for integration and theoretical testing of health behavior theories. In addition, the authors will make a unique contribution to HIV behavioral research by exploring why there is so much overlap yet so little explanatory power in the major theories used in HIV prevention literature. We conclude this article by offering a comprehensive plan for validating model accuracy, variable influence, and behavioral applicability that can be employed with various behavioral health theories. We will demonstrate this process using Social Action Theory (SAT; Ewart, 1991), a preexisting health behavior model, to illustrate translational methods HIV researchers can utilize to ensure theory applicability to study content.

## Overview of health behavior theory critiques

### Why are multiple theoretical models detrimental to health behavior research?

The use of poorly identified theories and the lack of a widely accepted formula for evaluating theories creates a fragmented literature that slows our understanding of HIV-related risk behaviors, leads to theory development with major construct overlap, and the development of theories with little explanatory power (Noar & Zimmerman, 2005). Weinstein (2007) notes that despite the abundance of health behavior studies, there is little information about causal factors in individuals' health behaviors or the superiority of one behavior theory over other theories.

This discrepancy has led to a fragmented literature. There is considerable confusion about why new models continue to be introduced to the field when it is unclear that existing theories are inadequate to begin with (Noar & Zimmerman, 2005). For example, the health belief model (DiClemente et al., 1992; Hingson et al., 1990), social-cognitive theory (Jemmott, Jemmott, Spears, Hewitt, & Cruz-Collins, 1992), the theory of reasoned action (Fisher, Fisher, & Rye, 1995) and the information-motivation-behavioral skills (IMB) model (Fisher & Fisher, 1992; Fisher, Fisher, Byran, & Misovich, 2002; Fisher, Fisher, Williams, & Malloy, 1994), have all guided HIV prevention efforts. However, each of these has relatively limited focus on factors impacting behavioral change. For example, the health belief model solely focuses on the cognitive factors impacting an individual's assessment

and belief in health promotive behavior. In social-cognitive theory, attention is paid to the way group norms impact behavior and attempts to incorporate the environment as a predictor of behavioral outcomes but fails to identify the salient pathways through which environment impacts group norms and individual beliefs. The theory of reasoned action combines both individual and social factors by addressing both individual attitudes and group norms that impact health behavior, but it does not delineate which outside influences could affect a person's choice to engage in preventative behavior. Likewise, the IMB model focuses on an individual's knowledge and motivation to practice health-promotive behavior without identifying what factors impact one's knowledge or motivation. Figure 1 provides a description of the aforementioned behavioral theories and the limitations to their explanatory nature.

As a result, many of these theories contain constructs that are very similar or identical, but use different terminology, creating the illusion that they are different (Conner & Norman, 1996; Nigg, Allegrante, & Ory, 2002; Noar & Zimmerman, 2005; Sutton, 1998; Weinstein, 1993). For example, the concept of "attitudinal beliefs" is known in various health belief theories as benefits, barriers, behavioral beliefs and evaluation of those beliefs, outcomes, and pros and cons (Noar & Zimmerman, 2005). Figure 2 provides a chart detailing the common constructs found within these health behavior theories and the various terminologies used to operationalize them. This contributes to the false impression of differences between models and perpetuates a major problem where variables used and defined in one area of HIV research cannot be compared across different studies and settings.

The overlap in variables between different health behavior theories (Conner & Norman, 1996), has done little to impact the fact that theories still leave much of the variance in behavior unexplained (Sutton, 1998). Certain theories may be overused due to errors in testing that have overestimated the accuracy of the health behavior theories (Weinstein, 2007). The fact that theories have so much overlap and so little explanatory power necessitates HIV researchers to evaluate whether there is merit in intervening to change independent variables specified in theory if those changes do not yield robust outcomes regarding predictions in behavior. Just as we see a call for comparative effectiveness in medicine today, so must the behavioral sciences look to empirical data to determine which theories are better at predicting behavior outcomes. To be able to do this we must address major theory translation problems including issues of power, variance, and difficulties comparing variables across different studies and settings. To clarify the steps of theory translation, this paper will next explore the importance of comparing theories and concludes with an explanation of how to statistically do so in order to ensure model accuracy, variable concurrence, and explanatory power.

### Criteria for assessing theories

In 2003, Ogden, wrote a controversial piece in *Health Psychology* outlining a methodology for assessing behavioral theories. Ogden's framework was based on four questions: (1) Is the theory useful? (2) Can the theory be tested? (3) Does the theory use analytic or synthetic truth? (4) Does the theory access or create cognitions? According to this framework, for a theory to be considered useful it should be able to explain health behavior, inform service development, and be used to develop interventions. For a theory to be testable it must have constructs that are sufficiently specific so as to generate testable hypotheses (Ogden, 2003). A good theory should generate synthetic rather than analytic truths to avoid being tautological. Ogden (2003) specifies that a theory's synthetic truth can only be known through exploration and testing while its analytic truth is a truth by definition. The fourth criterion is that a theory should not create cognitions, but rather access them. For example, most articles rely on self-report of behaviors. Self-report behavior can be contaminated by

self-report cognitions and any association found between the two could also reflect truth by definition rather than one that requires empirical testing (Ogden, 2003).

Furthermore, many researchers have continued to question the utility of health behavior theories and searched for a codifying mechanism or framework to unify similar theories (Fishbein, 2000; Institute of Medicine, 2002; Noar & Zimmerman, 2005, Ogden, 2003; Prochaska, DiClemente, & Norcross, 1992). Noar and Zimmerman (2005) recommend that the field move toward theory comparison using empirical techniques such as correlational analysis and structural equation modeling. They posit that after assessing behavior theory utility, empirical exploration is the preferred way to determine which theories are most accurate (Noar & Zimmerman, 2005).

## **Toward empirical validation: the case of Social Action Theory (SAT)**

Given that many health behavior theories have extensive overlap in constructs and structure, one must wonder if issues related to model accuracy, variable influence, and behavioral applicability of theory are merely issues of semantics. This led us on an archival search to determine if there was a preexisting model that better operationalized the constructs and most accurately depicted the pathways to predicting behavioral health outcomes. We specifically looked for a theory that was different from other catch-all theoretical frameworks like the Ecological Model (Bronfenbrenner, 1977) and depicted operationalized behavioral constructs and pathways to behavioral outcomes.

Our search uncovered SAT as a potential model for bridging the gap in utility and terminology across behavioral models because it includes individual, social, and contextual determinants that the literature designates as instrumental protective factors against risk behavior (Ewart, 1991; Mellins, et al., 2007; Remien et al., 2006; Simoni, Frick, & Haug, 2006). SAT (Ewart, 1991) presents a model of behavior change emphasizing the context in which health behavior occurs, developmentally driven self-regulatory processes, social interaction processes, and the mechanisms by which these variables result in health-promoting behavior (Gore-Felton et al., 2005; Lightfoot, Rotheram-Borus, Milburn, & Swendeman, 2005; Remien et al., 2003).

In addition, SAT incorporates an environmental context that is unique to this theory's framework, and provides a more holistic framework for looking health-promoting behavior:

The model's three dimensions, respectively, emphasize the role of social context in maintaining health routines or habits (action state dimensions), provide a causal framework linking self-change processes to interpersonal environments (process dimension), and specify macro social and environmental influences that empower or constrain personal change (contextual dimension) (Ewart, 1991).

See Figure 3 for a diagram of SAT.

In order to accurately assess whether SAT is a viable health promotion model, Ogden's criteria for assessing the utility of a theory was applied to SAT.

### **Is Social Action Theory (SAT) useful?**

Developed as a health promotion theory for behavioral medicine, SAT is very useful in that it expands previously mentioned social-cognitive models (Bandura, 1977; Catania, Kegeles, & Coates, 1990; Fishbein & Reuland, 1994; Janz & Becker, 1984) by specifically targeting contextual influences on, self-regulation processes, social relationships, and health promotion. More specifically, SAT proposes that health protection behaviors are a result of an interaction among three domains: (1) responses to internal affective states that influence

self-regulation processes, (2) the self-regulation capabilities of the individual, and (3) the larger environmental context (Ewart, 1991; Gore-Felton et al., 2005). This multidimensional targeting of behavior has proven to provide great utility and success in predicting and preventing behavioral health outcomes (Chen, Matthews, Soloman, & Ewart, 2002; Gore-Felton et al., 2005; Lightfoot et al., 2005; Sauro, Jorgensen, Ewart, Schum, & Gelling, 2005).

### **Is Social Action Theory (SAT) testable?**

SAT does not perpetuate the problem of being so broad it can't be replicated. Measurable variables have been selected and operationalized across studies. This eradicated the critical issue of how variables can be made consistent and hence comparable across studies. SAT has been used to examine behavioral health risks related to multiple health outcome including diabetes, heart disease, and immune diseases (Chen et al., 2002; Sauro et al., 2005). The domains of SAT (Ewart, 1991) have also been operationalized in HIV/AIDS-related research to better reflect the ecosystems in which individuals infected or affected by HIV develop and live (Ewart, 1991; Gore-Felton et al., 2005; Lightfoot et al., 2005). SAT has been tested and heavily operationalized and clarifies constructs resulting in a greater consensus and shared conceptual language amongst other health behavior models (Noar & Zimmerman, 2005) (See Figure 2). The testability of SAT has been triangulated via qualitative (Gore-Felton, et al., 2005; Lightfoot et al., 2005) and quantitative approaches and has a highly sophisticated level of operationalization when compared to other social-cognitive models.

### **Does Social Action Theory (SAT) use analytic or synthetic truth?**

Unlike many social-cognitive models, SAT has not relied on self-report of behavioral outcomes (i.e., heart disease, HIV transmission, diabetes). Therefore, there is little risk of self-report behavior being contaminated by self-report cognitions nullifying the concern that associations found between cognitions and outcomes could reflect truth by definition (analytic truth) rather than one that requires empirical testing (synthetic truth) (Ogden, 2003). Additionally, a substantial amount of empirical testing on both the pathways and constructs in SAT have been explored and tested to confirm the synthetic truth within the model.

### **Does Social Action Theory (SAT) access or create cognitions?**

The SAT model works effectively in explaining risk behavior in the context of environmental and cognitive factors. By model definition, environmental and personal factors generate cognitive processes within SAT. Therefore, it would be impossible for the theory to create cognitions rather than access them.

### **Methods for empirically validating Social Action Theory (SAT)**

The final step in determining the accuracy and applicability of SAT will be to follow Noar and Zimmerman's (2005) recommendation of using empirical techniques to determine the theory's salience. To do this one must determine if the theory's interaction of individual, contextual, and social correlates of risk-taking behaviors are applicable to a specific high-risk population. For the purposes of this empirical validation framework, the authors have chosen to apply statistical techniques to the population and area of research in which they are most versed: sexual risk behavior of young men who have sex with men (YMSM). While many quantitative and qualitative methods have been used to validate theories, we recommend the use of structural equation modeling for this empirical validation as it is currently the most statistically rigorous and advanced way of validating theory, taking into account the modeling of interactions, nonlinearities, correlated independents, measurement

error, correlated error terms, multiple latent independents each measured by multiple indicators, and one or more latent dependents also each with multiple indicators (Kline, 2004).

Based on the SAT depicted in Figure 3, a moderated mediation pathway can be assumed, in which the mediation effects of the self-change process constructs (e.g., social interaction, motivational appraisals, and generative capabilities) on the relationship between the initial contextual influences (e.g., background and action contexts) and distal behavioral outcomes will be moderated by subjects' mental health status. Accordingly, one would evaluate the domains and pathways of SAT by testing the following two hypotheses with the longitudinal data to ensure the temporal causality can be inferred.

### Hypothesis 1

Within SAT, initial contextual influences (e.g., characteristics of the immediate settings in which YMSM develop, including ethnicity, socioeconomic status, education, employment, life stressors, stability of living situation, and family support) will be positively related to YMSM's ability to develop self-change processes (e.g., seeking positive social support, accurately appraising risk, developing coping, and problem-solving skills), which in turn will reduce the use of drug and sexual risk-taking behaviors and increase health protective behavior.

A pathway model under the framework of longitudinal structural equation modeling analysis should be conducted to prospectively examine the hypothesized mediation pathway from variables of initial contextual influences to the intermediate self-change process constructs and to the distal outcomes of drug use, sexual risk-taking, and health protective behaviors while controlling for baseline composite scores of self-change process, sexual risk-taking, and health protective behaviors. If the first hypothesis is confirmed, a second hypothesis must be tested to empirically validate the chain of relationships:

### Hypothesis 2

Young men with poor mental health will have reductions in their ability to seek out positive social support, accurately appraise risk, and develop coping and problem-solving skills (self-change processes), which in turn will increase sexual risk taking, drug use, and alcohol misuse patterns and a reduction in health protection.

According to the relationships depicted in SAT, mental health will have moderating effects on the two segments of the mediation pathways, one from initial contextual influence to the intermediate self-change process, and the other from the intermediate self-change process to the distal behaviors. That is, mental health will not only moderate the relationship between contextual influences and self-change processes, but also regulate the relationship between self-change process and distal risk-taking behaviors. Multiple-group path models should be adopted to test if parameter estimates on mediation paths are consistent across categorized groups (MacKinnon, 1994). The two-group analysis in this study should proceed in the following steps: (1) the mediation path model described in Hypothesis 1 should be tested separately in the categorized groups; (2) a baseline multiple-group model should be obtained by combining models from each subgroups; and (3) the baseline multiple-group model should then be modified by constraining regression weight to be equal across groups. A likelihood ratio test (LRT) should then be conducted by calculating the difference of Chi-square values of baseline and modified models to examine whether the overall constraints are statistically appropriate. Therefore, the appropriateness should be determined by the comparison of goodness-of-fit between models with and without inserted equality constraints. The retained equality constraints indicate that the parameters are not

significantly different across subgroups, whereas the released equality constraints indicate that the parameters are significantly different across subgroups and that the group can be considered having moderational effect. Similarly, multiple-group dynamic models of LDS should be used to compare growth and changes related to potentially different group dynamics.

## Conclusion

These two hypotheses illustrate the previously mentioned point that the key criterion for assessing the value of a theory is the accuracy of its prediction and that critically specified, well-defined constructs and pathways can be used in different studies, in different settings, for different health problems. This framework for empirical analysis should help demonstrate how SAT will resolve inconsistencies and fill gaps in behavioral theory by establishing and testing the directional pathways driving relationships and motivators for risk and protective behaviors among YMSM. It is our hope that it will clarify the routes and interactions between environmental, psychological, and social factors that contribute to the confusion propagated by the overabundance of behavioral health theories. The authors encourage other HIV and health behavior researchers to use the model put forward here for empirical testing of other theoretical frameworks. The National Institutes of Health (2006) recently noted that effective behavioral research simultaneously targets multiple risk factors, integrates behavioral interventions into the environment, and intervenes at multiple systems levels. To that end, health behavior researchers should give strong consideration to selecting SAT as a guiding research model. Not only is it useful, testable, and comprehensive, it also provides a strong emphasis on environmental and cognitive factors predicting health behavior.

## References

- Bandura, A. Social learning theory. Englewood Cliffs, NJ: Prentice-Hall; 1977.
- Bronfenbrenner U. Toward an experimental ecology of human development. *American Psychologist*. 1977; 32:513–531.
- Catania JA, Kegeles SM, Coates TJ. Towards an understanding of risk behavior: An AIDS risk reduction model (ARRM). *Health Education and Behavior*. 1990; 17:53–72.
- Chen E, Matthews KA, Salomon K, Ewart CK. Cardiovascular reactivity during social and non-social stressors: Do children's personal goals and expressive skills matter? *Health Psychology*. 2002; 21:16–24. [PubMed: 11846340]
- Conner, M.; Norman, P., editors. Predicting health behavior. Buckingham: Open University Press; 1996.
- DiClemente RJ, Durbin M, Siegel D, Krasnovsky F, Lazarus N, Camacho T. Determinants of condom use among junior high school students in a minority, inner-city school district. *Pediatrics*. 1992; 89:197–202. [PubMed: 1734383]
- Ewart CK. Social Action Theory for a public health psychology. *The American Psychologist*. 1991; 46:931–946. [PubMed: 1958012]
- Fishbein DH, Reuland M. Psychological correlates of frequency and type of drug use among jail inmates. *Addictive Behaviors*. 1994; 19:583–598. [PubMed: 7701970]
- Fishbein M. The role of theory in HIV prevention. *AIDS Care*. 2000; 12:273–278. [PubMed: 10928203]
- Fishbein, M.; Triandis, HC.; Kanfer, FH.; Becker, M.; Middlestadt, SE.; Eichler, A. Factors influencing behavior and behavior change [Electronic version]. In: Baum, A.; Revenson, TA.; Singer, JE., editors. *Handbook of health psychology*. Mahwah, NJ: Lawrence Erlbaum; 2001. p. 3-16.

- Fisher J, Fisher W, Bryan A, Misovich S. Information-motivation-behavioral skills model-based HIV risk behavior change intervention for inner-city high school youth. *Health Psychology*. 2002; 21:177–186. [PubMed: 11950108]
- Fisher JD, Fisher WA. Changing AIDS-risk behavior. *Psychological Bulletin*. 1992; 111:455–474. [PubMed: 1594721]
- Fisher JD, Fisher WA, Williams S, Malloy TE. Empirical tests of an information-motivation behavioral skills model of AIDS-preventive behavior with gay men and heterosexual university students. *Health Psychology*. 1994; 13:238–250. [PubMed: 8055859]
- Fisher WA, Fisher JD, Rye BJ. Understanding and promoting AIDS-preventive behavior: Insights from the theory of reasoned action. *Health Psychology*. 1995; 14:255–264. [PubMed: 7641667]
- Gore-Felton C, Rotheram-Borus MJ, Weinhardt LS, Kelly JA, Lightfoot M, Kirshenbaum SB, et al. The healthy living project: An individually tailored, multidimensional intervention for HIV-infected persons. *AIDS Education and Prevention*. 2005; 17:21–39. [PubMed: 15843115]
- Hingson RW, Strunin L, Berlin BM, Heeren T. Beliefs about AIDS, use of alcohol and drugs, and unprotected sex among Massachusetts adolescents. *American Journal of Public Health*. 1990; 80:295–299. [PubMed: 2305908]
- Home, R.; Weinman, JP. Chapter 2: Predicting treatment adherence: An overview of theoretical models. In: Myers, LB.; Midence, K., editors. *Adherence to treatment in medical conditions*. Amsterdam: Harwood Academic Press; 1998. p. 25-50.
- Institute of Medicine. *Speaking of health: Assessing health communication strategies for diverse populations*. Washington, DC: National Academies Press; 2002.
- Janz NK, Becker MH. The health belief model: A decade later. *Health Education Quarterly*. 1984; 11:1–47. [PubMed: 6392204]
- Jemmott JB, Jemmott LS, Spears H, Hewitt N, Cruz-Collins M. Self-efficacy, hedonistic expectancies, and condom-use intentions among inner-city black adolescent women: A social cognitive approach to AIDS risk behavior. *Journal of Adolescent Health*. 1992; 13:512–519. [PubMed: 1390819]
- Kline, R. *Principles and practice of structural equation modeling*. 2. New York: Guilford Press; 2004.
- Lightfoot M, Rotheram-Borus MJ, Milburn NG, Swendeman D. Prevention for HIV-seropositive persons: Successive approximation toward a new identity. *Behavior Modification*. 2005; 29:227–255. [PubMed: 15657410]
- MacKinnon DP. *Analysis of mediating variables in prevention and intervention research*. NIDA Research Monographs. 1994; 139:127–153.
- Mellins CA, Dolezal C, Brackis-Cott E, Nicholson O, Warne P, Meyer-Bahlburg HFL. Predicting the onset of sexual and drug risk behaviors in HIV-negative youths with HIV-positive mothers: The role of contextual, self-regulation, and social-interaction factors. *Journal Youth and Adolescence*. 2007; 36:265–278.
- National Institutes of Health. *Health behavior change in mental disorders modeled from HIV interventions*. (RFA-MH-06-002). Bethesda, MD: NIH; 2006. Retrieved from <http://grants1.nih.gov/grants/guide/rfe-files/RFA-MH-06-022.html>
- Nigg CR, Allegrante JP, Ory M. Theory comparison and multiple-behavior research: Common themes advancing health behavior research. *Health Education Research: Theory and Practice*. 2002; 17:670–679.
- Noar SM, Zimmerman RS. Health behavior theory and cumulative knowledge regarding health behaviors: Are we moving in the right direction? *Health Education Research*. 2005; 20:275–290. [PubMed: 15632099]
- Ogden J. Some problems with social cognition models: A pragmatic and conceptual analysis. *Health Psychology*. 2003; 22:424–428. [PubMed: 12940399]
- Prochaska JO, DiClemente CC, Norcross JC. In search of how people change: Applications to addictive behaviors. *American Psychologist*. 1992; 47:1102–1114. [PubMed: 1329589]
- Remien RH, Hirky L, Johnson M, Weinhardt L, Whittier D, Le MG. Adherence to medication treatment: A qualitative study of facilitators and barriers among a diverse sample of HIV+ men and women in four U.S. cities. *AIDS and Behavior*. 2003; 9:61–72. [PubMed: 14534391]



- Remien RH, Stirratt MJ, Dognin J, Day E, El-Bassel N, Warne P. Moving from theory to research to practice: Implementing an effective dyadic intervention to improve antiretroviral adherence for clinic patients. *Journal of Acquired Immune Deficiency Syndromes*. 2006; 43:69–78. [PubMed: 16878046]
- Rosario M, Schrimshaw EW, Hunter J. A model of sexual risk behaviors among young gay and bisexual men: Longitudinal associations of mental health, substance abuse, sexual abuse, and the coming-out process. *AIDS Education and Prevention*. 2006; 18:444–460. [PubMed: 17067255]
- Sauro MD, Jorgensen RS, Ewart CK, Schum JL, Gelling P. Sociotropic cognition moderates stress-induced cardiovascular responsiveness in women through effects on total peripheral resistance, but not cardiac output. *International Journal of Psychophysiology*. 2005; 56(1):55–64. [PubMed: 15725490]
- Simoni JM, Frick PA, Huang B. A longitudinal evaluation of a social support model of medication adherence among HIV-positive men and women on antiretroviral therapy. *Health Psychology*. 2006; 25:74–81. [PubMed: 16448300]
- Smedslund G. A pragmatic basis for judging models and theories in health psychology: The axiomatic method. *Journal of Health Psychology*. 2000; 5:133–149.
- Sutton S. Predicting and explaining intentions and behavior: How well are we doing? *Journal of Applied Social Psychology*. 1998; 28:1317–1318.
- Weinstein ND. Testing four competing theories of health-protective behavior. *Health Psychology*. 1993; 12:324–333. [PubMed: 8404807]
- Weinstein ND. Misleading tests of health behavior theories. *Annals of Behavior Medicine*. 2007; 33:1–10.
- Zimmerman, RS.; Vernberg, D. Models of preventive health behavior: Comparison, critique and meta-analysis. In: Albrecht, G., editor. *Advances in medical sociology, health behavior models: A reformulation*. *Advances in Medical Sociology*. Vol. 4. 1994. p. 45-67.

Theory	Focus of theory	Innovation	Limitation
Health belief model	Deals with the process by which individuals assess their risk for poor health habits, assess the seriousness of the risk, weigh the benefits of action, and grapple with barriers to action.	Research has shown that people's attitudes/beliefs about prevention and consequences to risky behavior will have low barriers to health promotive behavior use.	Lacking research on alternative belief systems that may affect condom use above and beyond consequences of actions and probability that healthy behavior will be effective.
Social cognitive theory	Environment, people, and behavior are constantly influencing each other. The environment provides models for behavior via observational learning. Observational learning occurs when a person watches the actions of another person and the reinforcements that the person receives.	Incorporates the environment as a predictor of behavioral outcomes.	Does not clearly delineate the pathways by which the environment influences people and behavior.
Theory of reasoned action	An individual's preventative behavior is a function of their behavior intention (BI) to perform a particular preventive act. An individual's attitude toward how well preventative behavior works, their subjective norms, or what significant other desires behavior.	Developed to elucidate whether preventative behaviors were a function of personal attitudes, social norms, or both. Posits that intention is the immediate determinant of behavior. Intention is based on an individual's attitude, their evaluation of consequences, other's opinions that influences one's decisions (i.e., subjective norms), and one's motivation. Model builds on health belief model by finding that attitudes and norms dictate behavior.	Does not delineate which outside influences could affect a person's choice to engage in preventative behavior. Does not adequately explain the relationship and barriers between self-efficacy and decision-making.
Information-motivation-behavioral skills model	HIV prevention information and motivation work through preventive behavioral skills to influence risk reduction behaviors. In the IMB model, behavioral skills represent a common pathway for predicting complex preventive behaviors such as condom use.	Behavioral skills are a reflection of an individual's information and motivation. Information and motivation are treated as independent constructs where a well-informed person may not be motivated to practice preventive behaviors or an individual may be motivated to practice preventive behaviors but may not be particularly well informed.	Does not reflect environmental factors that have been shown to impact an individual's knowledge and motivation to practice health promotion.

**Figure 1.**  
Comparison of behavioral theories explanatory power.

Health belief model	Social-cognitive theory	Theory of reasoned action	Information-motivation-behavioral skills model	Social action theory	
Biological construct	Modifying factors	Personal factors	Not in model	Not in model	Background
Cognitive construct	Perceptions of risk	Personal factors	Attitude norms	<ul style="list-style-type: none"> <li>• Information</li> <li>• Motivation</li> </ul>	<ul style="list-style-type: none"> <li>• Motivational appraisal</li> <li>• Social interaction processes</li> <li>• Cognitive capabilities</li> <li>• Problem-solving</li> </ul>
Environmental construct	Not in model	Environmental factors	Subjective Norms	Not in model	Active contexts
Leaves of change	Core beliefs perception of cost-benefit	Self Efficacy as a function of perception of control	Attitudes and subjective norms	Behavioral skills	Health protective action

**Figure 2.**  
Comparison of construct definition across social-cognitive models.



**Figure 3.**  
Social Action Theory.