

EXAMINING THE THEORY OF PLANNED BEHAVIOR APPLIED TO CONDOM USE: A  
COMPARISON OF THE EFFECT-INDICATOR VS. CAUSAL-INDICATOR MODELS

A Dissertation by

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M.A., Wichita State University, 2005

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Submitted to the Department of Psychology  
and the faculty of the Graduate School of  
Wichita State University  
in partial fulfillment of  
the requirements for the degree of  
Doctor of Philosophy

December 2007

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I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirement for the degree of Doctor of Philosophy with a major in Community Psychology.

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## DEDICATION

This dissertation is dedicated to my parents  
and the psychology faculty at Southern University  
for instilling in me the value of education and excellence  
that I might instill it into another.

## ACKNOWLEDGEMENTS

The work presented before you is the culmination of my graduate studies in community psychology and exemplifies my ever-growing passion of statistical methodology in community psychology. It is joyfully dedicated to my loving family: Betty Carmack (mom), Henry Carmack (daddy), Chad (big brother), & Chandra (lil' sister), and Ella & Joshua Bryant- all for their never-ceasing prayers, support, and spiritual guidance. I love you and am forever in debt.

Throughout this journey, friends continued to keep me focused and grounded. Cassie, for your unconditional love and counsel (-know that you, too, will survive the [sometimes painful] enlightenment that graduate school brings); Louis, for your love and encouragement in my professional development; and Libby, Shani, & Nathan for your late night discussions and reassurance. It meant more than you will ever know.

This work would not be if not for the awesome WSU psychology department that chose me. Specifically, my advisor, Dr. Rhonda Kay Lewis-Moss, was and will continue to be an amazing woman, a true “mentor” in every sense of the word. She encouraged me to find my own career path in community psychology, even if it will not be the most common of choice. I am also grateful to my committee: Dr. Burdsal, for always being excited to discuss statistics with me; Dr. Merkle, for teaching me some of the more advanced statistical analyses; Dr. Meissen, simply for being a wonderful spirit and reminding me that I will be a great professional in the midst of my anxiety; and Dr. Matson, for taking the time to serve diligently.

Last, but not least, I must give homage to the Psychology Department of Southern University, Baton Rouge. Dr. Murelle Harrison, Dr. Reginald Rackley, Dr. Ivory A. Toldson (currently at Howard University), and Dr. Jocelyn Freeman, who gave me a foundation in higher education. The experience you gave was invaluable. In no way have I accomplished this alone.

## ABSTRACT

The theory of planned behavior was developed by Ajzen & Fishbein (1980) in an attempt to explain a number of health behaviors such as smoking, diet and exercise behaviors, diabetic management, and condom use (Glanz, Rimer, & Lewis, 2002). The theory of planned behavior asserts that actual behavior is a function of the intention to act. Intention, in turn, is a function of the weighted sum of attitudes toward the behavior, subjective norms about the behavior, and volitional control over the behavior. These global components were addressed, as well as their differentiated components. Two conceptually different augmentations of the theory, a causal-indicator model applied to the theory of planned behavior and an effect-indicator model applied to the theory of planned behavior were discussed and compared. Using the intent to use condoms as the extraneous dependent variable, both augmentations were evaluated by model fit indices in a structural model analysis. It was expected that the effect-indicator model would allow for the best-fitted explanation of the theory of planned behavior. The major hypothesis was supported through evaluation of the observed data. Thus, the effect-indicator model was found to be the most satisfactory conceptualization. Adolescent interventions that are driven by the theory of planned behavior may benefit from such a framework by focusing on behavior change with regard to the theory's global and differentiated components as modeled by the effect-indicator model.

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## CHAPTER I

### INTRODUCTION

The present study was conducted as a theory-based statistical analysis of the theory of planned behavior and its utility with regard to African American adolescents and condom use. The following introduction serves to formally introduce the theory of planned behavior and its global components. As the theory gained popularity, sub-components or “differentiated” components were discovered, and these are discussed. Previous literature specific to African American adolescents and condom use behaviors will also be reviewed. The causal-indicator model and the effect-indicator model will then be introduced as competing augmentations of the theory of planned behavior. To conclude, a discussion of both models and the study hypotheses will be outlined.

#### The Theory of Planned Behavior

The theory of planned behavior (TPB) (Ajzen & Fishbein, 1980) attempted to explain various health behaviors, such as smoking behaviors, diet and exercise behaviors, diabetic management, and condom use (Glanz, Rimer, & Lewis, 2002). The theory of planned behavior, a modification of the theory of reasoned action, was based on the assumption that human beings are usually quite rational and make systematic use of the information available to them (Ajzen & Fishbien, 1980). The theory contended that people estimate consequences of actions before deciding to engage or not engage (intent factor). According to the theory of planned behavior, intention, devoid of unforeseen circumstances that limit individual control, will help predict future behavior. The variance in intention is composed of three global constructs: 1) attitudes toward the behavior 2) subjective norms and 3) volition. Table 1 summarizes the theory’s global components: attitudes, subjective norms, volition, and intent.

Table 1. Theory of Planned Behavior Global Constructs.

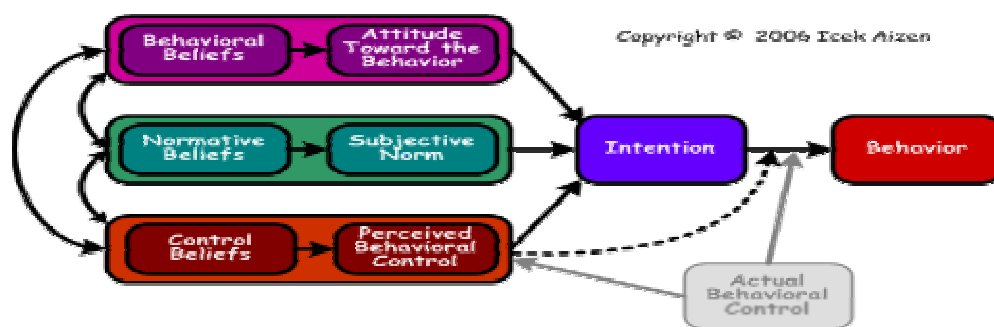
<b>Component</b>	<b>Description</b>	<b>Derived From</b>
Attitudes	The degree to which performance of the behavior is positively or negatively valued.	Expectancy-Value Attitude: Behavioral Beliefs
Subjective Norms	The perceived belief of others' attitudes about an individual's engagement in a behavior	Expectancy-Value Norm: Normative Beliefs
Volitional Control	The belief that one has the ability to perform a certain behavior	Control beliefs (presence of others, skills, confidence)
Intent	An indication of a person's readiness to perform a given behavior	Attitudes, Social Norms, Volitional Control

Attitude is a product of behavioral beliefs- an overall evaluation of whether the behavior is good or bad and expectations about the likelihood of certain outcomes that will come from performing the behavior (also known as expectancy-value attitude). Thus, attitude can be described as the degree to which performance of the behavior is positively or negatively valued. Subjective norms can be described as the perceived social influence to engage or not to engage in a behavior and are products of normative beliefs- whether one believes that significant others think he or she should perform the behavior. This is based on one's belief regarding the evaluation of others weighted by one's motivation to comply, also known as the expectancy-value subjective norm. [See Table 1.] The value that each individual places on either their attitude or subjective norm is known as its weight, and may be influenced by demographics, personality traits, and individual differences (Ajzen & Fishbien, 1980). Thus, the weight, or level of importance, of attitudes and subjective norms, depends on each person and increases or decreases the likelihood of performing the behavior. When person's attitude and subjective norms differ, their weights then become the deciding factor in whether an intent to act is made. An adolescent's beliefs about what others think they should do affect the intent-behavior relationship when too much weight is placed on the subjective norm, for example. The theory of planned behavior can also help to understand why people have certain attitudes and subjective norms, since the beliefs that one holds about oneself and the

world in which one lives underlie attitudes, and the perception that salient others believe one should or should not perform the act underlie subjective norms.

Volition is defined as the belief that one has the ability to perform a certain behavior. Control beliefs underlie volitional control and involve variables such as the presence of others, possession of skills required, confidence for the behavior, and acknowledgement of the occurrence of unforeseen circumstances- all elements that affect behavior but are not under a person's direct control. Along with attitudes and norms that influence intention, there must be a sufficient level of volition, or behavioral control. Theoretically, intention should always predict behavior, when under a person's volition. Therefore, behavioral intention is actually the mediating factor between the attitude/subjective norms/volition constructs and actual behavior. In addition, attitudinal components, subjective norms, and volition are mediating factors between external variables and intention. Note that actual behavioral control can both influence volitional control and actual behavior. To the extent that perceived behavioral control is accurate, it can serve as a proxy of actual control and can be used for the prediction of behavior (Ajzen, 1985). Figure 1 illustrates the conceptual model of the theory of planned behavior.

Figure 1. The Theory of Planned Behavior



### *Attitudes*

Attitudes have been the most widely researched component of the theory of planned behavior and continue to receive attention from social and cognitive psychologists (Bentler & Speckart, 1981;

Sheeran, Norman, & Orbell, 1999; Ajzen, 2001). It is unknown whether cognition (in the form of beliefs) or affect (in the form of feelings-as-information) precedes an overall evaluation that will create an attitude. Previously, Haddock & Zanna (1998) found that attitudes may be predicted by feelings or beliefs. Participants identified as “thinkers” cognitively used beliefs for attitude formation, while participants labeled “feelers” affectively used their feelings to form attitudes about several social issues.

Recently, the notion that attitudes consist of one and only one unique disposition to evaluate a psychological object or behavior has been revamped to specify that when a new attitude overrides an old attitude, it does not imply that the old attitude is replaced (Ajzen, 2001). For example, assume that an adolescent’s attitude toward condom use is not proactive. In light of risk and protective factors and knowledge, the new attitude may be proactive toward condom use. Due to contextual factors, and motivation, capacity is required to retrieve the explicit attitude, as opposed to the implicit, habitual attitude. This is problematic for adolescents because different evaluations of the same behavior (i.e., condom use) in different contexts can be considered evidence of multiple attitudes toward the same behavior. An adolescent girl may understand and agree with the use of condoms when talking with her mother, but does not bring up the issue with her new boyfriend because she trusts him, even if she feels confident that she could. But when beliefs (cognition) do not match up with feelings-as-information (affect), affect will override attitude (Ajzen, 2001). Thus, deliberation of the attitude construct is extensive.

### *Subjective Norms*

With regard to norms, individuals differ in the weight they place on subjective norms or attitudes as influencers; these also vary across behaviors (Ajzen, 2001). In other words, some adolescents may give importance to their attitude about the behavior when deciding to engage in the behavior, while other adolescents may give more importance to what they think others think they should do. Results are conflicting on whether subjective norms are a significant influence of intentions. Hagger & Chatzisarantis (2005) and Ajzen (2001) found a lesser role for subjective norms in the domain of exercise. Using a sample of university students and volunteers, Hagger & Chatzisarantis (2005) surveyed 596 participants (344 women and 252 men) on attitudes, subjective norms, and intentions to participate in vigorous physical activities such as sports and active pastimes that raise heart rate. Factor loading correlations for attitude and behavioral intention were .824, while factor loading correlations for subjective norms and behavioral intention were .583. Both were significant at the .01  $\alpha$  level, however. Thus, in this case, attitude appears to have a stronger correlation than subjective norms in influencing intention. In the work of Gollwitzer & Brandstaettier (1997) regarding 30 ambiguous behaviors, undergraduates (N=187) were measured on attitudes, subjective norms, and intentions. Behavior was assessed two weeks later. Results indicated that the intention-behavior relationship was significantly correlated with the attitude-intention path ( $r=.26$ ,  $p<.001$ ), but not significantly correlated with the subjective norm-intention path ( $r=.1$ ,  $p>.05$ ) (Gollwitzer & Brandstaettier, 1997). However, in the works of Kashima, Gallois, & McCamish, (1994), Sutton (1994), as well as Carmack & Lewis-Moss (2005) there was a greater role for subjective norms as it relates to condom use behaviors.

It was previously found that when attitudinally-controlled individuals were evaluated on intention, the contribution of subjective norms disappeared. Conversely, when normatively-controlled persons were evaluated, their subjective norms were enhanced. Notwithstanding, stronger intention-behavior correlations have been found among groups with significant attitude-intention relationships

than among groups with significant subjective norm-intention relationships (Sheeran, et al., 1999). Taken together, the majority of previous research yielded conflicting evidence on the overall importance placed on subjective norms and its relation to intention.

### *Volition*

Ajzen (1991) asserts that volition be measured to account for aspects of a target behavior that are not under a person's true volitional control. Volition can be thought of as perceived behavioral control, such as the ability to perform in the midst of situational circumstances. However, the issue of volition was deemed "causally ambiguous" because it is contingent on a person's estimate of actual control. In adding a measure of volition, behavioral control variables directly predicted intentions to carry out a planned behavior, as well as the actual behavior (Ajzen & Madden, 1986). As an illustration, perceived behavioral control toward receiving a high grade for a college course significantly contributed to the students' intention to score high, over and above attitude or subjective norms (Ajzen & Madden, 1986). Thus, volition is theoretically mediated by actual behavioral control.

### *Intention*

The intention-behavior relationship is essentially a schema for relevant behaviors showing strong relations between the path from intention to behavior. Intention will serve as the extraneous dependent variable under investigation.

As the theory explains, an individual's intent to engage in a behavior is a direct determinant of whether he or she will act. To accurately assess the intention-behavior relationship, one must also identify the target, then take into consideration the time, context, and behavior on which the intent is being judged (Ajzen & Fishbein, 1980; Ajzen & Fishbein, 2000). Notwithstanding, the theory's validity is achieved through empirical support for the relationships among attitudes, subjective norms, volitional control, and their relative path weights that lead to intention.



## Global Constructs & Differentiated Constructs of TPB

The *global constructs* of the TPB are attitudes, subjective norms, and volition and have been previously explained. Distinctions have been found among these global constructs, as some of the variance in intentions remains unexplained by the global constructs (Conner & Armitage, 1998). Recently, sub-components of the global constructs, known as *differentiated constructs* were identified that better explain the variance within attitudes, normative values, and volition (Ajzen, 2001; Rhodes & Courneya, 2003; Hagger & Chatzisarantis, 2005). Table 2 outlines these differentiated constructs under their global construct heading. The distinctions of attitude include affective attitude and instrumental attitude; the distinctions of subjective norms include descriptive norms and injunctive norms; and the distinctions of volition include perceived controllability and self-efficacy. Statistically, these differentiated constructs are supported by empirical evidence (Manstead & van Eekelen, 1998; Armitage & Conner, 1999; Povey, Conner, Sparks, James, & Shepherd, 2000; Hagger, Chatzisarantis, & Biddle, 2002; Ajzen, 2001; Ajzen, 2002; Rhodes & Courneya, 2003; Hagger & Chatzisarantis, 2005), indicating that they may better explain change in the global components, and thus may better explain the global construct's influence on intention. Meta-analytic reviews also support the validity of the differentiated constructs in a wide variety of health behaviors, including exercise behavior, fruit and vegetable intake, and condom use (Albarracín, Johnson, Fishbein, & Muellerleile, 2001). The subsections that follow will further explain the differentiated constructs of attitudes, subjective norms, and volition.

Table 2. Differentiated Constructs of the Theory of Planned Behavior (Ajzen, 2002).

<b>Attitude</b>	
Affective Attitude	whether an individual likes or dislikes the behavior (enjoyable/unenjoyable)
Instrumental Attitude	whether an individual believes behavior is beneficial (more beneficial/more harmful)
<b>Subjective Norms</b>	
Injunctive Norms	Whether the behavior is approved by important others

Descriptive Norms	Whether the behavior is performed by important others
<b>Volitional Control</b>	
Perceived Controllability	The extent that an individual has access to the means of control
Self-Efficacy	An individual's situation specific self confidence for engaging in the behavior

*Affective and Instrumental Attitude*

The differentiated constructs of attitude, affective attitude and instrumental attitude, have been observed as distinct constructs (Ajzen, 2001, 2002). Affective attitude is measured by whether one likes the behavior (enjoyable/unenjoyable). Instrumental attitude is measured by whether one believes behavior is beneficial (more beneficial/more harmful). However, these differentiated constructs share variance. Thus, it has been hypothesized that even though affective attitude and instrumental attitude may be distinguishable at the subordinate level, they are still best explained by a global construct of attitude (Bagozzi, Lee, & van Loo, 2001).

*Descriptive and Injunctive Norms*

Differentiated constructs of subjective norms are descriptive norms and injunctive norms, and were found to be distinct and exhibit divergent validity (Ajzen, 2001, 2002; Rhodes & Courneya, 2003; Hagger & Chatzisarantis, 2005). Descriptive norms are measured as behavior that is performed or endorsed by significant others. Injunctive norms are measured as one's behavior that he or she feels is important to significant others. Conceptually, both forms are perceived as a controlling type of social influence. Empirically, they are typically highly correlated; indicating that they may be better subsumed by a global construct.

*Perceived Controllability and Self-Efficacy*

Ajzen (2001) formally gave introduction to two distinct types of volition: perceived controllability and self-efficacy. Perceived controllability is the extent that an individual has access to the means of control; and self-efficacy is individual's situation specific self confidence for engaging in

the behavior (Ajzen, 2002).

Since the theory can explain why people come to behave the way that they do, it simultaneously gives the researcher a basis for explaining behavior change and gives the practitioner a basis for implementing behavior change through intervention. This has important implications in dealing with adolescent sexual behavior, such as increasing intentions to use condoms.

#### TPB Interventions in Condom Use Behaviors

As previously illustrated, the theory of planned behavior provided insights as to why an individual would choose one behavior over another, and is thus useful to community psychologists and prevention scientists wishing to influence the contributing factors of adolescent decision making. For example, according to the theory of planned behavior, if you believe that important friends have a positive attitude about your using condoms (the subjective norm), it may confirm your own attitude about condom use (the attitude about the behavior). When the subjective norm and the attitude about the behavior are congruent, they would together influence the adolescent's intent to engage in sex with a condom. If not congruent, there will be reduced likelihood of the actual occurrence of the behavior depending on the relative strength of subjective norms and attitude. However, intent will fail to predict actual behavior if there is no condom available or if he or she has no efficacy in the proper use of a condom (volition). But with sufficient volition, this intent would then lead to the behavior: condom use during sexual activity.

As a result of its theoretical utility, the theory of planned behavior has been incorporated in various adolescent prevention interventions (Jemmott, Jemmott, & Fong, 1992; Jemmott, Jemmott, & Fong, 1998; DiClemente, et al., 2004) and many programs that incorporate safer sex education have been established (Miller, Boyer, & Cotton, 2004).

Utilizing the theory of planned behavior, Jemmott, et al. (1992) assessed risky sexual behavior

during the previous three months, intentions and attitudes regarding risky sexual behavior in the next three months, and an AIDS and STD knowledge questionnaire. The theory-driven intervention resulted in greater knowledge about AIDS, less favorable attitudes toward risky behavior, and weaker intentions to engage in risky behavior at posttest (Jemmott, et al., 1992). In a similar study, the theory-driven intervention group showed positive changes in condom-use knowledge, beliefs about condom use, impulse control, and self-efficacy to use condoms (Jemmott, et al., 1998). It is important to note that the aforementioned interventions were conducted with African American adolescents, as was the present analysis.

Taken together, these findings may provide community researchers with valuable insight into the attitudinal and normative beliefs of adolescents as it relates to behavior change in condom use and other adolescent sexual behaviors. Such interventions also demonstrate the efficacy of interventions based on the theoretical grounding of the theory of planned behavior.

## Study Rationale

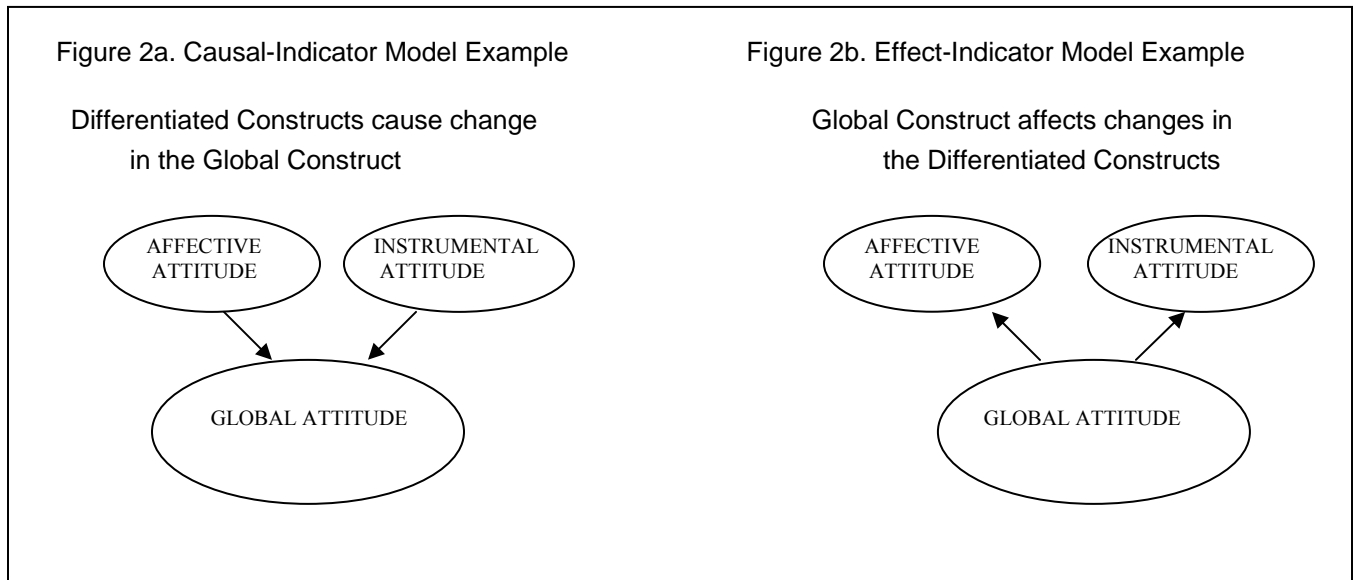
### *Competing Models of TPB: Causal-Indicator Model vs. Effect-Indicator Model*

Recently, two independent augmentations using the differentiated constructs of the theory of planned behavior have been developed: the causal indicator model (Rhodes & Courneya, 2003) and the effect-indicator model (Hagger & Chatzisarantis, 2005). Both models use both differentiated and global constructs; however, these constructs operate differently in both models, which made this crucial distinction the basis for current investigation.

The causal-indicator model by Rhodes & Courneya (2003) asserted that the differentiated constructs exert direct influence upon the global constructs. Thus, the variance within the global constructs would be explained by its differentiated constructs. In contrast, the effect-indicator model by Hagger & Chatzisarantis (2005) asserted that the global constructs exert direct influence upon the differentiated constructs. Thus, the variance within the global construct may affect the differentiated constructs independently. In other words, changes in a global construct may increase the value in one or more of its differentiated constructs. This leaves theoretical speculation for other possible differentiated constructs since differentiated constructs are unlikely to completely contribute to the total variance within global construct. Figure 2a and 2b graphically illustrates this distinction.

Thus, the rationale for the present study was put forth to expand the literature and empirically tested which of the two models best influenced adolescent's intentions to use condoms, a comparison that has never been done previously using the same sample. The present study also contributed to the TPB and its utility in directing condom use intention, which recently, has not been as widely examined as a health behavior to be applied to TPB than attitude change or diet management, for instance. The following sections are designed to 1) provide sufficient detail regarding the conceptualization of both the causal-indicator model (Rhodes & Courneya, 2003) and the effect-indicator model (Hagger &

Chatzisarantis, 2005) and 2) examine the results of previous literature utilizing both models.



Evidence is conflicting as to which health behaviors, and for what population, is a causal-indicator model or effect-indicator model more optimal. The causal-indicator model posits that the differentiated constructs actually cause change in the global constructs [Figure 2a]. In contrast to the causal-indicator model, Hagger & Chatzisarantis (2005) identified an effect-indicator model [Figure 2b]. In an effect-indicator model, the global constructs affects the differentiated constructs, as opposed to the causal-indicator model in which the differentiated constructs are thought to directly influence the global constructs.

Proponents of the causal-indicator model argue that an effect-indicator model seemed unlikely to accurately reflect the causal world of social-cognitive concepts that they assume are interchangeable. The causal-indicator model proposed by Rhodes & Courneya (2003) contends that the differentiated constructs cause change in the global constructs, rather than that the differentiated constructs are simply affected by the global constructs, making the use of both global constructs and differentiated constructs necessary for theory conceptualization. Concerns with regard to the causal-indicator model are 1)

causation is a matter of method (i.e., random sampling, random assignment, and the use of a control group), not necessarily analysis. All paths are correlational and may not always imply causation; and 2) the causal-indicator model suggests that the differentiated constructs are uniquely contributing to the global constructs, however, the differentiated constructs are correlated. Therefore, the global constructs does not reflect the true nature of the differentiated constructs and, in fact, represents an inflated contribution within the causal-indicator model. The causal-indicator model contends that unexplained variance in the relationship between the differentiated constructs is from exogenous variables influencing the both of them (Rhodes & Courneya, 2003). However, “without external criteria, a cause-induced latent variable is psychologically uninterpretable (Bollen & Lennox, 1991).” Statistically, the effect-indicator model is preferred because the differentiated constructs are not orthogonal, are positively correlated, and thus may be subsumed into global constructs, given that the within-construct correlation exceed the between-construct correlation.

*Causal-Indicator Model.* Rhodes & Courneya (2003) investigated the use of a causal-indicator model to assess whether global constructs or differentiated constructs would account for behavior in the exercise domain. Using a sample of cancer survivors (N=272; mean age, 61) and a sample of undergraduates (N=300; mean age, 20), results indicated that the use of differentiated constructs or global constructs for attitudes, subjective norms, and volition were mixed. The results showed a global construct for attitude in the undergraduate sample, and only the differentiated construct of affective attitude for cancer survivors. Also, a global construct for subjective norms was identified for both samples; and only the differentiated construct of self-efficacy for volition. Thus, self-efficacy showed greater influence over controllability.

Furthermore, volition showed no direct relationship to behavior when controlling for intention in the undergraduate sample. This is in contrast to Azjen (2002), who explained that volition was better

subsumed by a global construct. In corroboration with Azjen (2002), the global construct of volition showed a significant relationship to behavior for cancer survivors. The authors proposed that volition may capture non-motivational aspect of behavior, as in time resources and money availability, for example. Results also indicate that age might factor into whether the use of differentiated or global components are preferred.

*Effect-Indicator Model.* Hagger & Chatzisarantis (2005), used a sample of university students and employees to test intentions on both dieting and exercise separately (N=523 and N=596, respectively). The dieting sample consisted of 201 males and 322 females (mean age, 21), and the exercise sample consisted of 252 males and 344 females (mean age, 27). A self-report questionnaire was administered. The questionnaire consisted of 8 items representing attitudes (4 items representing affective attitudes and 4 items representing instrumental attitudes), 8 items representing normative values (4 items representing descriptive norms and 4 items representing injunctive norms), 4 items representing volition (2 items representing perceived controllability and 2 items representing self-efficacy), and 4 items representing intentions to conform to diet behaviors or exercise behaviors, separately. A two week follow-up was conducted to assess actual behavior using a 2-item questionnaire. An effect-indicator model was constructed in order to fit the observed data. Several fit indices were used for assessing both models. Table 3 lists model fit indices assessed and their utility to structured equation modeling.



Table 3. Model Fit Indices

Fit Index	Utility
$\chi^2$ Model Chi Square	Tests that a predicted model's covariance structure model is significantly different from the observed covariance matrix. Should be non-significant
CFI Comparative Fit Index	Compares predicted covariance matrix to the observed matrix, then compares the null model to the observed matrix to gauge the lack of fit accounted for within the null model.
NNFI Non-Normed Fit Index	Proportion by which the predicted model improves from the null model, while not assuming chi-square differences and controlling for complexity.
RMSEA Root Mean Square Error of Approximation	CFI (discrepancy) per degrees of freedom and does not assume a null model. Advantageous since it controls for lack of parsimony due to increasing parameters.
PNFI Parsimony Normed Fit Index	The proportion by which the predicted improves fit over the null model weighted by the Ratio of df in predicted model to df in null model. When comparing two given models, the higher value is the more parsimonious.

According to all fit indices, the effect-indicator model exhibited adequate fit. Both global constructs and differentiated constructs were almost identical in its ability to affect behavior. For dieting behavior, the effect-indicator model using both differentiated and global components yielded a  $\chi^2$  (391)=722.262,  $p>.01$ ; CFI=.957; NNFI=.953; RMSEA=.040. Seventy-four percent of the total variance in intentions was explained by this model for affecting dieting behavior. For exercise behavior, the effect-indicator model (using both differentiated and global components) yielded a  $\chi^2$  (391)=984.365; CFI=.942; NNFI=.935; RMSEA=.054. Eighty-one percent of the total variance in intentions was explained by this model for affecting exercise behavior. See Table 3 for a complete list of fit indices used in this methodology and their contribution to assessing model fit.

Noteworthy is the PNFI, which indicates that the model that utilized both global constructs and differentiated constructs could not be rejected, as it yielded higher values than the differentiated-only model (1<sup>st</sup> order PNFI=.836 and 2<sup>nd</sup> order PNFI=.857 for dieting behaviors; 1<sup>st</sup> order PNFI=.822 and 2<sup>nd</sup> order PNFI=.840 for exercise behaviors). Thus, the model that utilizes both global and differentiated components was the more parsimonious model and disconfirmed that higher order factors (global constructs) would not account for relationships between first-order (differentiated) constructs.

### Study Hypotheses

The present study addressed the two competing models by hypothesizing that the effect-indicator model would yield a better fit to the observed data than the causal-indicator model. Because there are large unexplained correlations between the differentiated constructs (Ajzen, 2001), it is also hypothesized that the global constructs, are thus a satisfactory model of the differentiated components. The global constructs may be viewed as the essence of the differentiated constructs since it reflects shared variance in the differentiated constructs. This is the case if the two differentiated components (e.g., affective and instrumental attitude) are highly correlated. Ajzen (2002) corroborated this, contending that although differentiated components are more distinct, the correlations between each pair can be subsumed by the global constructs.

Most all reviewed literature concluded that the particular model was “confirmed.” It is important to note that models cannot be confirmed, only *not disconfirmed*, due to the existence of equivalence. Within the assumptions of a structural equation modeling analysis, a model may only be “not disconfirmed.” Thus, the present study also addressed the possibility of equivalent models. Hypotheses to be investigated through empirical investigation are as follows:

- 1) It was hypothesized that the effect-indicator model will yield a more optimal fit than the causal-indicator model when observed data is evaluated for model fit. The author

hypothesized that observed data would fit the effect-indicator model beyond that of the causal-indicator model. This was done through evaluating model fit indices (Table 3). In contrast, if the differentiated constructs cannot act as indicators of the global constructs, then that particular set of differentiated constructs may be independent of its global constructs, thus favoring the causal-indicator model.

- 2) It was hypothesized that global constructs within the theory of planned behavior would satisfactorily account for the variance in intention when applied to the intent to use condoms for African American adolescents. The author hypothesized that global constructs within the theory of planned behavior would account for covariances between the differentiated components and thus, account for majority of variance in intention when applied to the intent to use condoms for adolescents. Consequently, the global constructs represents shared variance among the differentiated indicators. This is advantageous because it can restore parsimony to the theory of planned behavior, and will permit the inclusion of further specific-level constructs that can serve as additional indicators of the global attitude, subjective norms, and volition.
- 3) It was hypothesized that within the most optimally-fitted model, the subjective norms construct would yield a higher path value than attitudes when predicting intentions to use condoms for this African American adolescent sample. There remains confusion as to which construct yields a greater path value to intentions and for what kinds of populations it applies. Thus, the author hypothesized that subjective norms will yield a greater path value than the attitude construct for African American adolescents' intentions to use condoms.

## CHAPTER II

### METHOD

#### *Participants*

The study population consisted of 462 African American adolescents, age 12 - 17, who were recruited from the Wichita, Kansas and surrounding areas. These adolescents participated in Youth Empowerment Project (YEP) over the course of one year. Forty-four percent of the participants were male (N=196), and 56% of the participants were female (N=252). Sixty percent (N=268) of participants reported no previous HIV/AIDS classes. Thirty-seven percent (N=164) reported having had sex at baseline. Sixty-three percent (N=280) reported never having had sex *Measures*

The Youth Empowerment Project survey was developed by Drs. John and Loretta Jemmott and was used in this study. With specific recommendations for utilizing the theory of planned behavior, the YEP survey included 274 questions. These items, the majority of which were set to the 5-point likert scale, were divided into various subsets. These subsets of questions assessed the adolescents' sexual behavior, sexual attitudes, HIV/AIDS knowledge, self-perception, alcohol and drug use, as well as many other health and risky behavior questions. There were two gender-specific versions of the survey due to the nature of the sexual behavior questions. The survey also captured educational and economic background information, parents' occupation and marital status.

The present analysis used the condom use variables in the sexual attitudes subscale of the survey. This subscale consisted of 71 items, (F)69-(F)139, and was divided into two parts by the authors. The first part of the sexual attitudes subscale asks questions about how adolescents perceive approval from others on the issue of sex. For example, one question asks, "Would your sexual partner approve or disapprove of your using a condom if the two of you have sex in the next 3 months?" Scale: Disapprove strongly (1) to Approve strongly (5). The second part of the sexual attitudes subscale makes statements

to which the adolescents were asked to agree or disagree. An example question is, “Sex wouldn’t feel as good if my partner and I used a condom;” scale: Disagree strongly (1) to Agree strongly (5). Only questions pertaining to condom use were utilized for the present study.

### *Procedure*

The YEP was approved by the Institutional Review Board at Wichita State University. The YEP used radio and newspaper ads to target the African American adolescent population. Sessions were held on Saturdays at the Wichita State University’s main campus. Adolescents were told about the Youth Empowerment Project and its goals, namely risk reduction. They were also informed that they could discontinue participation for any reason at any time. After submission of their informed consent, the adolescents were given a behavioral contract, which was created to increase their assurance that the findings would not be reported to their parents, and only as a group or aggregate data. The behavior contract encouraged the adolescents to respond honestly to the survey’s very personal questions and reiterated that their responses will be kept completely confidential and away from parents. Trained facilitators then conducted the risk reduction class sessions after adolescents were given the initial pretest. After the session, adolescents were given a posttest, specifically constructed utilizing the theory of planned behavior to assess their knowledge, attitudes, perceptions, norms, and many other behaviors (Ajzen, 2000).

*Analysis Procedure.* The present study was designed to test the two augmentations of the theory of planned behavior as it applies to the intent to use condoms among African American adolescents. Analysis procedure consisted of testing both the causal-indicator model and the effect-indicator model and evaluated their model fit. Manifest variables were selected to indicate attitude (affective attitude and instrumental attitude), subjective norms (injunctive norms and descriptive norms), and volition (controllability and self-efficacy); and two manifest variables indicating intentions to use condoms, which served as the dependent variable. Principle components analysis (SPSS 15.0) was used in order to reduce the condom use variables into six proposed factors. Items with factor loadings of .6 and higher were chosen and not-disconfirmed through confirmatory factor analysis procedures (Amos 7).

Both models, the causal-indicator model and effect-indicator model, were constructed using Amos 7 statistical modeling software. Observed data was imposed onto the model for “fit.” Both models were then compared using various fit indices and evaluated accordingly.

## CHAPTER III

### RESULTS

#### Preliminary Analysis

Preliminary analysis explored the applicability and results of four conventional guidelines (Bollen & Lennox, 1991) for construct measurement: 1) Data reduction and the use of factor analysis, 2) construct indicators should be internally consistent for valid measures, 3) within-construct correlations must be greater than between-construct correlations, and 4) validity, assessed by the nature of the specified domain and the adequacy with which the domain is measured.

#### Exploratory Factor Analysis

Exploratory factor analysis (EFA) was applied to the condom use variables in the sexual behavior subsection of the survey instrument. The items were divided among six factors, reflecting the six differentiated components (affective attitude, instrumental attitude, descriptive norms, injunctive norms, perceived controllability, and self-efficacy). Items with an adequate structure loading, and congruent with the theory, were selected for consideration in the measurement model. The measurement model resulted in  $\chi^2=684.7$ ,  $p<.05$ ; CFI=.94; RMSEA=.051. The condom use items chosen for inclusion in the structural equation model SEM can be found in Appendix A, Table A1.

*Unexpected Findings.* Concerning the measurement device of the present study, there were 9 eigenvalues that exceeded 1.0 according to the Kaiser-Guttman analysis, suggesting that the survey may have contained 9 differentiated constructs, as opposed to the 6 differentiated constructs previously explained (i.e., affective attitude, instrumental attitude, descriptive norms, injunctive norms, perceived controllability, and self-efficacy) of which the survey was created to contain.

In addition to instrumental attitude, descriptive norms, injunctive norms, perceived controllability, and self-efficacy, a further distinction of negative affective attitude (factor 1) and

positive affective attitude (factor 2) seemed to emerge, which was previously subsumed by the affective attitude factor. The principle component analysis also indentified items that seemed to measure self-efficacy in partnership relations (factor 8), which was previously subsumed by the self-efficacy factor and consequences of lack of condom use (factor 9), which was previously subsumed by the instrumental attitude factor. EFA using 9 constructs resulted in  $\chi^2 = 1767(354)$   $p < .05$ ; CFI=.97; RMSEA=.050; AIC= 2049.528 and EFA using 6 constructs resulted in  $\chi^2 = 2251.658(347)$ ,  $p < .05$ ; CFI=.94; RMSEA=.051; AIC= 2425.658. However, the present analysis will utilize the model with six constructs since these known differentiated constructs have been supported and validated by past empirical literature, and will serve to facilitate greater generalizability.

*Internal Consistency*

Cronbach’s  $\alpha$  was used to calculate the internal consistency of the factor items. All factor items exhibited adequate fit (except for perceived controllability, which exhibited moderate fit; Cronbach’s  $\alpha = .77$ ).

Table 4. Internal Consistency of Construct Items

Factor	Cronbach’s $\alpha$
Factor 1: Affective Attitude	.90
Factor 2: Instrumental Attitude	.85
Factor 3: Descriptive Norm	.95
Factor 4: Injunctive Norm	.82
Factor 5: Perceived Controllability	.77
Factor 6: Self-Efficacy	.90



### *Within- and Between-Construct Correlations*

The correlations of indicators within the same construct (factor) should exceed the correlations between constructs. Because items in the same construct should theoretically “cluster together,” it is expected that they would exhibit higher shared variance than the comparison of two separate constructs. For example, the items within the construct of affective attitude should correlate more highly than the correlation between affective attitude and instrumental attitude, two separate constructs.

The items within each construct were correlated and compared with its correlation between factors. For each construct, all within-factor item correlations exceeded the between factor correlations. A comparison of within-factor correlations with between-factor correlations can be found in Appendix B, Tables B1-B6.

### *Validity*

The validity of the sexual behaviors subscale of the survey must sample all facets of a multi-dimension construct (factor). This may be conceptualized by noting that the principle components analysis resulted in clusters of the highly loading items for each construct (i.e., affective attitude, instrumental attitude, descriptive norms, injunctive norms, perceived controllability, and self-efficacy) of condom use. The correlations of items within each construct are, at best, moderate. However, items that are too highly correlated may be too redundant to sample efficiently the breadth of the various facets of the constructs and scores need not necessarily correlate highly with one another (Epstein, 1983 and Cattell, 1965).

### Primary Analysis

Primary analysis explored 1) descriptive statistics of the cleaned and screened data set, 2) some considerations of SEM, and 3) hypothesis testing.

### *Descriptive Statistics*

Cleaning and screening of the data included eliminating respondents who failed to respond to 10% or more of the subscale items. Also, respondents who failed to answer both intention questions were also eliminated. The original dataset of 462 respondents resulted in 446 cases. In the resulting dataset, 41% (N=183) were male and 59% (N=263) were female. The dataset comprised 98.9% African American, 4% Caucasian, 6% Hispanic, .7% Asian, and 14.1% Native American. (Adolescents were asked to respond “yes” or “no” to each racial/ethnic category, which obviously resulted in overlap.) Thus, the majority of the sample consisted of African American adolescents. Two-hundred and sixty-eight (60%) of the adolescents reported never having sexual intercourse. Of those who reported having had sexual intercourse, 53.7% (N=96) were male and 46.3% (N= 82) were female. Of those who reported having had sexual intercourse, 37.8% (N=174) “always” used condoms during their last coitus and 13% (N=58) “never” used condoms during their last coitus. There were no statistical differences in the males’ and females’ reported condom use during their last coitus.

### *Statistical Considerations*

Prior to hypothesis testing, the following major considerations of SEM were evaluated: adequate sample size, multiple indicators of latent variables, low measurement error, recursivity, interval or near-interval data, and normal distribution of the indicators. One rule of thumb found in the literature is that sample size should have at least 15 cases per measured indicator (Stevens, 1996). In the present study, there were 28 measured indicator variables, yielding an approximate sample size of 420. The present sample consisted of 446 cases, thus in congruence with the sample size consideration. The resulting data set utilized multiple indicators of the six latent variables: Affective attitude was measured using 5 indicators; instrumental attitude was measured using 3 indicators; descriptive norms was measured using 4 indicators; injunctive norms was measured using 4 indicators; perceived controllability was measured using 5 indicators; self-efficacy was measured using 5 indicators; and intention was measured using 2

indicators. Although 3 or more indicators is a general rule of thumb for SEM, it is noted that if there are only two indicators for a latent variable (such as intention), then they should be correlated in order to prevent underidentification of the model (Kline, 1998). The two items that measure intention (“I will use a condom if I have sex in three months” and “I plan to use a condom if I have sex in three months”) are relatively highly correlated,  $r = .553$ . In addition, low measurement error may be concluded from the high and moderate Cronbach’s  $\alpha$  values of the items (discussed above). Thus, the data was congruent with the consideration of low measurement error. The model has been evaluated for recursivity, as well as over-identification. In congruence with the assumptions, all arrows in the model flowed one way, there were no feedback loops, and error terms for the endogenous variables were uncorrelated in both models. Both models were over-identified with positive degree of freedom values. Although the present data used ordinal scale data, and is therefore in violation to the assumption of interval data, SEM is robust to the violation of this assumption. The use of likert-scale ordinal data may be viewed as near-interval data. Indicator variables showed a negative skew, with the majority of respondents choosing “agree” and “strongly agree” in response to the items. However, simulation studies demonstrated that with the use of SEM, parameter estimates are still fairly accurate, but standard errors of the estimate may be under-estimated (Kline, 1998).

### *Hypotheses Testing*

The first hypothesis stated that the effect-indicator model would exhibit preferable fit indices over and beyond the causal-indicator model. Table 5 compares the fit indices of the effect indicator model to those of the causal-indicator model. According to all fit indices, the effect-indicator model reports optimal values to that of the causal-indicator model. Appendix C, Figure C1 and Figure C2 illustrates the path diagrams of the effect-indicator model and the causal-indicator model with parameter estimates.

Table 5. Effect-Indicator & Causal-Indicator Models Fit Indices

Fit Index	Effect-Indicator Model	Causal-Indicator Model
$\chi^2$	954(339), $p < .05$	1528.633(353), $p < .05$
CFI	.891	.803
NNFI	.869	.774
RMSEA	.064	.087
PNFI	.701	.661
AIC	1145.969	1694.663

The effect-indicator model resulted in  $\chi^2=954(338)$ ,  $p < .05$ . The CFI (comparative fit index) = .891. This indicates that 89.1% of the covariation in the data can be reproduced by the hypothesized model. The NNFI (non-normed fit index) = .869. This indicates that the hypothesized model improves fit by 86.9% when compared to the null model while penalizing for model complexity. Corresponding with the liberal cutoff of .80, the hypothesized model exhibits reasonably good fit according to the NNFI. The RMSEA (root mean square error of approximation) = .064. This indicates the discrepancy or lack of fit per degrees of freedom; a fit measure based on the hypothesized versus observed covariances while penalizing for model complexity. In other words, the RMSEA controls for an inflated degrees of freedom. Using the more liberal cutoff of .06, the hypothesized model exhibits moderate fit according to the RMSEA. The PNFI (parsimony normed fit index) = .701. PNFI uses the ratio of the degrees of freedom in the hypothesized model to the degrees of freedom in the null model and then calculates the improvement of fit over the null model. Therefore, when adjusting for degrees of freedom difference, the hypothesized model improves fit by 70.1%. Lastly, in model comparison, the lower AIC (Akaike information criterion) value indicates the preferred model.

With regard to the effect-indicator model, when affective and instrumental attitude were regressed on the exogenous latent variable attitude, the resulting estimates were -.020 and .021, respectively. This suggested that when attitude increased by one unit, affective attitude decreased by .02 units and instrumental attitude increased by .21 units; however, neither estimate was statistically

significant. When descriptive and injunctive norms were regressed onto the exogenous latent variable subjective norms, the resulting estimates were 1.161 and .862, respectively. This suggested that when subjective norms increased by one unit, descriptive norms increased 1.161 units and injunctive norms increased by .862 units; both were statistically significant at the .01  $\alpha$  level. When perceived controllability and self-efficacy were regressed onto the exogenous latent volition, the resulting estimates were -.185 and .873. This suggested that when volition increased by one unit, perceived controllability decreased .185 units and self-efficacy increased by .873 units; both were statistically significant at the .01  $\alpha$  level. Furthermore, attitude and subjective norms were not a significant influence on intention (attitude-intention,  $\gamma=.015$ ,  $p=.990$  and subjective norm-intention,  $\gamma=.111$ ,  $p=.427$ ). However, volition showed a significance influence on intention, volition-intention  $\gamma=.627$ ,  $p<.001$ .

With regard to the causal-indicator model, when attitude was regressed on the exogenous latent variables affective and instrumental attitude, the resulting estimates were .40 and .73, respectively; however, neither estimate was statistically significant. When subjective norms was regressed onto the exogenous latent variables descriptive and injunctive norms, the resulting estimates were 1.83 and .546, respectively. This suggests that when descriptive norms increased one unit, subjective norms increased 1.83 units and when injunctive norms increased one unit, subjective norms increased .546 units; both estimates were significant at the .05  $\alpha$  level. When volition was regressed onto the exogenous latent variables perceived controllability and self-efficacy, the resulting estimates were .022 and -.42.8, respectively; however, neither estimate was statistically significant. Furthermore, when subjective norms are modeled to be influenced by descriptive and injunctive norms, as opposed to exerting influence upon them, subjective norms is found to have a significant influence upon intention, subjective norms-intention,  $\gamma=.223$ ,  $p<.01$ . Volition was also found to have a significant influence upon intention, volition-intention  $\gamma=.637$ ,  $p<.01$ .

The second hypothesis stated that the original conceptualization of the TPB will yield a greater fit over and beyond that of the best-fitting augmentation model (the effect-indicator model), thus restoring parsimony to the TPB. According to all fit indices, the original TPB model failed to exhibit better fit than the effect-indicator model, an augmentation of the original theory. Table 16 compared the fit indices of the effect indicator model to those of the original TPB model.

Table 6. Original TPB Model Fit Indices

Fit Index	Original TPB Model	Effect-Indicator Model
$\chi^2$ (df)	2251.7 (347); $p < .05$	954(339), $p < .05$
CFI	.675	.891
NNFI	.619	.869
RMSEA	.111	.064
PNFI	.547	.701
AIC	2425.658	1145.969

In light of the accepted effect-indicator model, the global model of TPB did not satisfactorily account for the variance in intention when applied to the intent to use condoms for African American adolescents.

The third hypothesis stated that the subjective norms construct would yield a higher path value than attitudes when predicting intentions to use condoms for this African American adolescent sample. A nested model comparison was conducted within which the attitude-intention path and the subjective norms-intention path were constrained to be equal. When constraining both the attitude-intention path and the subjective norms-intention path to be equal, the critical ratio of the difference of the attitude-intention path and the subjective norms-intention was .075. Byrne (2001) states that if the critical ratio of the difference of two paths does not exceed 1.96, then the two paths are significantly equivalent at the .05  $\alpha$  level. This indicates that within the effect-indicator model, these paths are statistically equal (Byrne, 2001). However, through post-hoc examination it was found that when the covariance of subjective norms and volition is taken out, the subjective-norm path becomes significant in influencing

intention ( $\gamma = .437$ ,  $p = .004$ ). Only when subjective norms are allowed to covary with volition does the significance of subjective norms in the influence of intention disappear. Attitude remained a non-significant influence on intention in all post-hoc examinations.

## CHAPTER IV

### DISCUSSION

#### *General Findings*

Hypothesis 1 stated that the effect-indicator model would be the preferred model over the causal-indicator model. Based on various fit indices, hypothesis 1 was supported by the data. This finding is consistent with Hagger & Chatzisarantis (2005) findings that the differentiated construct model was shown to account for significant variance in intention; furthermore, the present findings added to the empirical evidence for the distinctions found among the differentiated constructs (Hagger & Chatzisarantis, 2005; Rhodes & Courneya, 2003; Ajzen, 2002; Hagger, et. al, 2001; Povey, et. al, 2000; Armitage & Conner, 1999; Manstead & van Eekelen, 1998). A plausible explanation has to do with the way in which the global and differentiated constructs operate within each model. Within the effect-indicator model, the differentiated constructs acted as indicators of the global constructs. This implies that as the global construct increased, the differentiated constructs would simultaneously show an increase. On the other hand, the causal-indicator model contended that the differentiated constructs directly influenced the global constructs. This suggests that a change in one differentiated construct (e.g., affective attitude) could influence the global construct (e.g., attitude) without there being a change in any other differentiated construct (e.g., instrumental attitude). Modeling differentiated constructs as dependent on the global construct does not make substantive sense due to the nature of attitude. Causal-indicator models are beneficial in modeling multidimensional constructs, such as SES. For example, latent variables of education, income, and neighborhood might have direct influence the global construct of SES. One could expect a change in education to influence SES without a simultaneous change in income and neighborhood due to the multidimensionality of SES (Bollen & Lennox, 1991; Browne & MacCullen, 2003a). However, this would not be the case based on the nature of the global components



(attitude, subjective norms, and volition) and the conceptualization of effect-indicator model. Intention may be said to reflect multidimensional constructs contributing to the intention to use condoms. But the differentiated constructs influenced by the global constructs (i.e., affective and instrumental attitude, descriptive and injunctive norms, and perceived controllability and self-efficacy) subsume underlying uni-dimensionality. Thus, the causal-indicator model is preferred only if a latent construct is multidimensional with no underlying uni-dimensional concept.

It is important to note that even though the hypothesized model could not be disconfirmed, there may indeed be other augmentations of the TPB that adequately explain intention. Based on the considerations of equivalent models (Browne & MacCallum, 2003b), there are approximately 81 augmentations of the TPB that would equally reproduce the variance in intention just as well as the hypothesized effect-indicator model. Although two equivalent models may be statistically equivalent, their substantive meaning may be altered. If they are substantively sensible, then they offer alternative explanations to the data (Browne & MacCallum, 2003). Using the Lee-Hershberger (1990) saturated proceeding block rule, subjective norms may be modeled to directly influence volition and volition may be modeled to directly influence attitude, which would then influence intention. In this simple example, volition and attitude have become mediator variables leading to the latent variable intention; when before, they were only direct influences on intention.

Hypothesis 2 stated that the global model (the original TPB model) would satisfactorily account for the variance in intention. In light of the effect-indicator model, the global model did not account for the variance in intention over and beyond the effect-indicator model. Thus, hypothesis 2 was not supported by the data. This finding was not congruent with previous studies that found that differentiated constructs could be subsumed into global constructs (Hagger & Chatzisarantis, 2005; Rhodes & Courneya, 2003; Ajzen, 2002). This suggests that the differentiated constructs may be too

distinct to be subsumed by a global construct alone with regard to sexual behaviors and/or an African American adolescent population. This is in contrast to Hagger & Chatzisarantis (2005) who found that even though the differentiated constructs were distinct on the subordinate level, they were best subsumed by a global construct using exercise and diet behaviors with a mainstream sample of college students.

Hypothesis 3 stated that the subjective norm-intention path would have a greater influence over and beyond that of the attitude-intention path. Based on the data, hypothesis 3 was not supported, as neither the subjective norm-intention path nor the attitude-intention path contributed significantly to the variance in intention. Furthermore, the paths were statistically equal within the effect-indicator model. Results are conflicting on the role of subjective norms versus attitudes in influencing intention. Within the preferred model (effect-indicator model), subjective norms did not significantly influence intention. However, parameter estimates of the causal-indicator model as well as the global model both indicated a significant subjective norm-intention path ( $\gamma = .223$ ,  $p < .001$  and  $\gamma = .303$ ,  $p < .001$ , respectively). Notwithstanding, it is important to note that the causal-indicator model and the original TPB model were rejected overall based on their poor fit indices. The attitude-intention path was not significant in any of the models evaluated. Taken together, these findings were consistent with Ajzen (2001) in that individuals differ in the weight they place on subjective norms or attitudes as predictors of intention, and that these vary across behaviors. The present study served as a contribution to the literature in that the weights placed on subjective norms or attitudes also vary across populations (i.e., African American adolescents). Consistent with prior research, which contends that volition is an “optimal empirical predictor [influence] of intention (Ajzen, 2002),” volition was found to have the ultimate influence on intention with regard to sexual behaviors and African American adolescents. Furthermore, Ajzen (2002) contends that volition is best subsumed by the global construct volition, but the effect-indicator model

found that as volition increased, self-efficacy increased significantly ( $\gamma = .837, p < .001$ ), but perceived controllability significantly decreased ( $\gamma = -.185, p < .001$ ). This suggested that an African American adolescent's self-reported volition coincides with the perception of decreased availability and resources needed to acquire condoms, but would increase situation-specific ability to use a condom with a particular partner or in the dark, for example. It is also interesting to note the incremental difference between the influence of volition upon perceived controllability and self-efficacy, as self-efficacy has a much stronger weight than perceived controllability. This could have important implications for theory-driven community programs for African American adolescents. Interventions that focus on the situation-specific abilities of African American adolescents to negotiate condom use could have a greater influence in their intentions to use condoms during sex, thus influencing actual condom use.

### *Surprising Findings*

The sexual behaviors subscale of the survey instrument, which included the condom use variables used for the present analysis, was specifically constructed from the theory of planned behavior and was expected to yield six distinct factors indicating the six differentiated constructs. Based on the eigenvalues of the principle components analysis applied to the condom use variables, there emerged nine conceptually distinct factors for this sample. Affective attitude was split into a negative affective attitude and a positive affective attitude. (With six factors extracted, they were all included in the same factor.) Negative affective attitudes towards condoms and condom use behaviors had higher loadings than positive affective attitudes, suggesting that negative attitudinal aspects of condoms or condom use behaviors are more important than positive aspects.

There was also a distinction of self-efficacy and partnership-specific self-efficacy. The role of self-efficacy in partnership behaviors seemed to be different from general self-efficacy. The behavior of using a condom during sex is not entirely a self-directed behavior. It is a partnership behavior and thus,

it would make sense that one's ability to successfully use condoms during sex, relies on one's ability to convince another to agree with its use. Beliefs that are particular for one's sexual partner were found to directly influence attitudes, norms, and intentions (Kashima, et. al, 1994). The availability of a condom and an agreement with partner to use a condom interacts with intention. Adolescents may be taught to negotiate condom use prior to sex, prior to the prospect of any sexual encounter; for instance, while on the telephone with their love-interest.

### *Limitations*

Some limitations should be noted. Only 40% of the adolescents reported being sexually active at the time of assessment. A larger, more representative sample could have affected the results. The sexual activity of the African American adolescents was not indicative of the original Jemmott, et al., (1992) study on which this study was replicated.

No previous research identifies the proportion of error in self-reported sexual behaviors. Therefore no fixed error estimates could be established. An a priori fixed error estimate on an indicator would have allowed the researcher to exert more meaning upon the latent concept and place theoretical constraint within the model (Rhodes & Courneya, 2003).

The variance of the latent constructs could not be constrained within the construct itself using Amos 7 statistical software. Therefore, the researcher had to constrain the highest related path value to 1 in order to set the scale of the loadings. Some researchers suggest that it is more optimal to set the scale by constraining variance within the latent variable so that all paths may be freely estimated. This, in turn, could have affected the results.

### *Future Research*

First and foremost, future research should include a replication of the present study using another sample of African American adolescents. Although acceptable, the RMSEA indicated that the effect-

indicator model might require modification. It would be interesting to see if the model could yield acceptable or better indices with a similar sample. Future research may also include various replication studies using different aspects of the present study. Presently, African American young adults are showing an increase in HIV rates. The TPB could be validated on this particular population, which has been shown to be unique with regard to the onset and progression of their risky behaviors.

An indication of past behavior would add to the theoretical power of the TPB in influencing intention. Past behavior implies that a person is familiar with certain resources needed to carry out condom use (Ajzen & Fishbein, 1980; Bentler & Speckart, 1981; Frederick & Dossett, 1983; Manstead, Proffitt, & Smart, 1983; and Kashima, et al., 1994). Intentions that were consistent with past behavior were stable enough to be carried out, even in the presence of the dynamics of a sexual encounter. Longitudinal studies may also include a proxy of actual behavior by using population-based HIV rates, STD rates, and adolescent pregnancy. Goal-setting may be a worthwhile implementation to interventions promoting positive intentions. Difficult goals are more easily attained when there is an implementation of intentions (Ajzen, 2002; Kashima, et. al, 1994).

Other less complex behaviors (i.e., non- partnership behaviors) might be modeled using the effect-indicator and causal-indicator model. Behaviors such as diabetes management and educational intentions could be evaluated for uni- or multidimensional concepts by evaluating fit indices of an effect-indicator model or a causal-indicator model when applied to the respective intentions.

### *Conclusions*

Theory-driven research in community psychology continues to provide community improvement through various psychological, social, and ecological considerations. The present study was congruent with previous studies that support the validity of the theory's components in a wide variety of health behaviors including condom use (Hagggar & Chatzisarantis, 2005; Albarracin, et. al, 2001). The theory of

planned behavior was not disconfirmed as a model for African American adolescents' intentions to use condoms, and thus, may be useful in curbing the spread of HIV, STDs, and other adverse outcomes of unprotected sex. Indeed, other theories may exist that equally or better explain risky behavior, such as the social-cognitive theory or the stages of change model. These theories, among many others, should not be discounted as valuable possibilities when attempting to model behavior and influence change in African American adolescents.

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## APPENDICES

## Appendix A

Table A1. Condom Use Variables used for PCA, CFA, & SEM Analysis

Factor 1: Affective Attitude
1. Sex is unnatural with condoms
2. Condoms ruin the mood
3. Condoms break the rhythm
4. Condom use means you are promiscuous
5. Sex good with condom use
Factor 2: Instrumental Attitude
1. Condoms prevent pregnancy
2. Condoms prevent AIDS
3. Condoms prevent STDs
Factor 3: Descriptive Norms
1. Friends approve the use of condoms
2. Father approves the use of condoms
3. Mother approves the use of condoms
4. Sex partner approves the use of condoms
Factor 4: Injunctive Norms
1. Importance of mother's opinion
2. Importance of partner's opinion
3. Importance of father's opinion
4. Importance of friends' opinion
Factor 5: Perceived Controllability
1. It is too much trouble to carry condoms
2. It is hard to get condoms
3. If I have a condom, my partner would not like
4. Using condoms mean no trust
5. I will break up with partner if s/he use condom
Factor 6: Self-Efficacy
1. Partner can use condom without ruining mood
2. I am sure that I can use condoms with sex
3. Can say to partner use condom
4. Can talk to partner about condoms before sex
5. Can use condom in the dark
*Factor 7: Intention
1. Do you feel you will use a condom if sex in the next 3 months
2. I plan to use a condom if sex in the next 3 months
*** p< .001

Appendix B  
Within-Construct & Between Construct Correlations

Table B1. Affective Attitude

Factor 1: Affective Attitude	Sex is unnatural with condoms	Condoms ruin the mood	Condoms break the rhythm	Condom use means you are promiscuous	Using condoms is embarrassing
Sex is unnatural with condoms	1	.585**	.494**	.356**	.357**
Condoms ruin the mood	.585**	1	.459**	.359**	.417**
Condoms break the rhythm	.494**	.459**	1	.435**	.289**
Condom use means you are promiscuous	.358**	.359**	.435**	1	.349**
Using condoms is embarrassing	.357**	.417**	.289**	.349**	1
*** p< .001					

Affective Attitude and Instrumental Attitude:  $r = .369$

Affective Attitude and Descriptive Norms:  $r = -.244$

Affective Attitude and Injunctive Norms:  $r = .155$

Affective Attitude and Perceived Controllability:  $r = .309$

Affective Attitude and Self-Efficacy:  $r = .164$

Table B2. Instrumental Attitude

Factor 2: Instrumental Attitude	Condoms prevent pregnancy	Condoms prevent AIDS	Condoms prevent STDs
Condoms prevent pregnancy	1	.636**	.628**
Condoms prevent AIDS	.636**	1	.616**
Condoms prevent STDs	.628**	.616**	1
*** p< .001			

Instrumental Attitude and Affective Attitude:  $r = .369$

Instrumental Attitude and Descriptive Norms:  $r = -.166$

Instrumental Attitude and Injunctive Norms:  $r = .067$

Instrumental Attitude and Perceived Controllability:  $r = -.151$

Instrumental Attitude and Self-Efficacy:  $r = .398$

Table B3. Descriptive Norms

Factor 3: Descriptive Norms	Friends approve the use of condoms	Father approves the use of condoms	Mother approves the use of condoms	Sex partner approves the use of condoms
Friends approve the use of condoms	1	.831**	.827**	.770**
Father approves the use of condoms	.831**	1	.877**	.786
Mother approves the use of condoms	.827**	.877**	1	.736**
Sex partner approves the use of condoms	.770**	.786**	.736**	1
*** p< .001				

Descriptive Norms and Affective Attitude:  $r = -.244$

Descriptive Norms and Instrumental Attitude:  $r = -.166$

Descriptive Norms and Injunctive Norms:  $r = .206$

Descriptive Norms and Perceived Controllability:  $r = -.207$

Descriptive Norms and Self-Efficacy:  $r = .523$

Table B4. Injunctive Norms

Factor 4: Injunctive Norms	Importance of partner's opinion	Importance of mother's opinion	Importance of father's opinion	Importance of friends' opinion
Importance of partner's opinion	1	.559**	.489**	.470**
Importance of mother's opinion	.559**	1	.662**	.538**
Importance of father's opinion	.489**	.662**	1	.471**
Importance of friends' opinion	.470**	.538**	.471**	1
*** p< .001				

Injunctive Norms and Affective Attitude:  $r = .155$

Injunctive Norms and Instrumental Attitude:  $r = .067$

Injunctive Norms and Descriptive Norms:  $r = .206$

Injunctive Norms and Perceived Controllability:  $r = .038$

Injunctive Norms and Self-Efficacy:  $r = .351$

Table B5. Perceived Controllability

Factor 5: Perceived Controllability	It is too much trouble to carry condoms	It is hard to get condoms	If I have a condom, my partner would not like	Partner will break up with me if I use condom	Using condoms mean no trust
It is too much trouble to carry condoms	1	.397**	.317**	.223**	.267**
It is hard to get condoms	.397**	1	.205**	.222**	.174**
If I have a condom, my partner would not like	.317**	.205**	1	.464**	.422**
Partner will break up with me if I use condom	.233**	.222**	.464**	1	.547**
Using condoms mean no trust	.267**	.174**	.422**	.547**	1
*** p< .001					

Perceived Controllability and Affective Attitude:  $r = .309$   
 Perceived Controllability and Instrumental Attitude:  $r = -.151$   
 Perceived Controllability and Descriptive Norms:  $r = -.207$   
 Perceived Controllability and Injunctive Norms:  $r = .038$   
 Perceived Controllability and Self-Efficacy:  $r = .137$

Table B6. Self-Efficacy

Factor 6: Self-Efficacy	Partner can use condom without ruining mood	I am sure that I can use condoms with sex	Can say to partner use condom	Can talk to partner about condoms before sex	Can use condom in the dark
Partner can use condom without ruining mood	1	.680**	.534**	.468**	.646**
I am sure that I can use condoms with sex	.680**	1	.512**	.538**	.652**
Can say to partner use condom	.534**	.512**	1	.710**	.477**
Can talk to partner about condoms before sex	.468**	.538**	.710**	1	.452**
Can use condom in the dark	.646**	.652**	.477**	.452**	1
*** p< .001					

Self-Efficacy and Affective Attitude:  $r = -.164$

Self-Efficacy and Instrumental Attitude:  $r = .394$

Self-Efficacy and Descriptive Norms:  $r = .523$

Self-Efficacy and Injunctive Norms:  $r = .351$

Self-Efficacy and Perceived Controllability:  $r = .137$



## Appendix C

Figure C1. Path diagram and Parameter estimates ( $\lambda$ ,  $\gamma$ ) for the Effect-Indicator Model



Figure C2. Path diagram and Parameter estimated ( $\lambda$ ,  $\gamma$ ) for the Causal-Indicator Model

