

Examining the Theory of Planned Behavior Applied to Condom Use: The Effect-Indicator vs. Causal-Indicator Models

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Abstract The authors investigated whether a causal-indicator model or an effect-indicator model of the theory of planned behavior (TPB) is more suitable for predicting behavioral intention and for which behaviors. No previous studies have evaluated this question using the same sample and same behavior. In this study, African American adolescents ages 12–17 participating in risk reduction classes were assessed on their initial attitudes, norms, perceived control, and intention regarding condom use. Second-order structural equation modeling indicated that the effect-indicator model exhibited superior fit above the causal-indicator model. Furthermore, modeling the behavioral antecedents in a causal way may not be as accurate due to the underlying uni-dimensional nature of attitudes, subjective norms, and control. The TPB was not disconfirmed as a suitable model for African American adolescents' regarding condom use. Prevention programs may benefit by focusing on adolescent behavior change with regard to the global components in order to influence more specific concepts of these social cognitions. *Editors' Strategic Implications:* Despite limitations including correlational data, this study yields implications for prevention programming and, more broadly, an important theoretical elaboration on effect-indicator and causal-indicator models of the TPB.

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Introduction

The theory of planned behavior (TPB), 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 and Fishbein 1980). The theory contended that people estimate certain factors before deciding to engage or not engage in a behavior (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: (a) attitude toward the behavior, (b) subjective norms, and (c) control. Several studies have reported the association of the intention-behavior relationship (Ajzen 1985, 2001; Ajzen and Fishbein 1980; Conner and Armitage 1998). It also has been found that intentions have a substantial causal effect on behavior (Webb and Sheeran 2006). Webb and Sheeran (2006) conducted an extensive meta-analytic review of 37 studies that directly manipulated intention through intervention and assessed this effect on subsequent behavior. Studies using random assignment of intervention and control groups resulted in significant differences in intentions between the groups, and studies that included a follow-up measure were included in the analysis. They found that a change in intention ($d = .66$) directly brings about a change in behavior ($d = .36$), which further supports that the intention to engage in a behavior indeed affects carrying out that particular behavior. Furthermore, for several of the studies evaluated, the effect size for objectively recorded behavior, as opposed to self-reported behavior, was even greater ($d = .67$).

Previous studies fully support the validity of these social cognitive constructs in a wide variety of health behaviors, including exercise behavior, fruit and vegetable intake, and condom use (Albarracin et al. 2001; Godin and Kok 1996; Hagger and Chatzisarantis 2005; Sheeran et al. 1999). Recently, there has been controversy as to how attitudes, subjective norms, and control are modeled to influence behavior (Hagger and Chatzisarantis 2005; Rhodes and Courneya 2003). Two independent augmentations using these social cognitive components have been developed to model the intention to engage in health behaviors: the causal-indicator model (Rhodes and Courneya 2003) and the effect-indicator model (Hagger and Chatzisarantis 2005). Both models use the same components: (a) subjective norms (descriptive norms and injunctive norms), (b) attitude (affective attitude and instrumental attitude), and (c) control variables (perceived behavioral control and self-efficacy). However, these components operate differently in both models, which make this crucial distinction (the way in which these components operate to influence intentions) the basis for current investigation. This is important because researchers and practitioners will be able to create prevention programs that focus specifically on the constructs needed to modify or change behavior that are regarded as important through empirical investigation. What follows is a brief description of

the differentiated components of the TPB, the distinction between the causal-indicator and effect-indicator model conceptualizations, and rationale for the present study.

Differentiated Components in the TPB

Because some of the variance in intentions remains unexplained by attitude, subjective norms, and control, differentiated components were identified that were able to explain the variance within attitudes, subjective norms, and control (Armitage and Conner 1999; Ajzen 2001; Conner and Armitage 1998; Hagger and Chatzisarantis 2005; Rhodes and Courneya 2003). Differentiated components of attitude include affective attitude (the degree to which a behavior is thought to be enjoyable) and instrumental attitude (the degree to which a behavior is thought to be beneficial). Differentiated components of subjective norms include descriptive norms (whether one believes the behavior is performed by important others) and injunctive norms (whether one believes the behavior is approved by significant others). The differentiated components of control variables include perceived controllability (whether one believes he or she has the resources to carry out a specific behavior) and self-efficacy (the situation-specific belief that one has the confidence to carry out a specific behavior). Table 1 describes these differentiated components. Empirical evidence indicates that some of these differentiated components may explain intention (Armitage and Conner 1999; Ajzen 2001, 2002; Hagger and Chatzisarantis 2005; Hagger et al. 2002; Manstead and van Eekelen 1998; Povey et al. 2000; Rhodes and Courneya 2003). As such, they may also explain change in the global components and thus lend more insight into the global construct’s influence on intention. Research also indicates that each differentiated component pair is highly correlated, which indicates that they may be better subsumed by their respective global construct (Ajzen 2001; Bagozzi et al. 2001).

Table 1 Differentiated constructs of the Theory of Planned Behavior (Ajzen 2002)

Construct	Description
Attitude	
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)
Subjective norms	
Injunctive norms	Whether the behavior is approved by important others
Descriptive norms	Whether the behavior is performed by important others
Volitional control	
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

Causal-Indicator vs. Effect-Indicator Model of TPB

The causal-indicator model of the TPB introduced by Rhodes and Courneya (2003) asserted that the differentiated components exert direct influence upon their respective attitude, subjective norms, and control variables (see Fig. 1a). Thus, the variance within the attitude, subjective norms, and control would be better explained by their individual differentiated components. By modeling differentiated constructs as causal-indicators of their global construct, Rhodes and Courneya investigated the use of a causal-indicator model to assess whether global constructs or differentiated constructs would account for behavior in a sample of exercise participants ($N = 300$; mean age of 20) and cancer survivors ($N = 272$; mean age of 61). Results were mixed regarding the preferred use of differentiated constructs or global constructs for attitude, subjective norms, and control. 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. Only the differentiated construct of self-efficacy for control was identified for both samples. It is important to note that, although Rhodes and Courneya preferred the causal-indicator model conceptualization of the TPB, they did not create an effect-indicator model to empirically test its model fit of the samples.

In contrast to the causal-indicator model, the effect-indicator model by Hagger and Chatzisarantis (2005) asserted that attitudes, subjective norms, and control exert direct influence upon their respective differentiated components (See Fig. 1b). The effect-indicator model evaluates whether an observed construct (e.g., attitude) can be defined or captured by the variance shared between the indicant constructs (e.g., affective attitude and instrumental attitude). Thus, changes in attitude, subjective norms, and control may lead to changes in the differentiated constructs independently. This leaves theoretical speculation for other possible differentiated constructs since differentiated constructs are unlikely to completely contribute to the total variance within the global construct. Using an effect-indicator model of the TPB, Hagger and Chatzisarantis were able to explain 74% of the total variance in dieting behavior intentions ($N = 523$) and 81% of the total variance in exercise

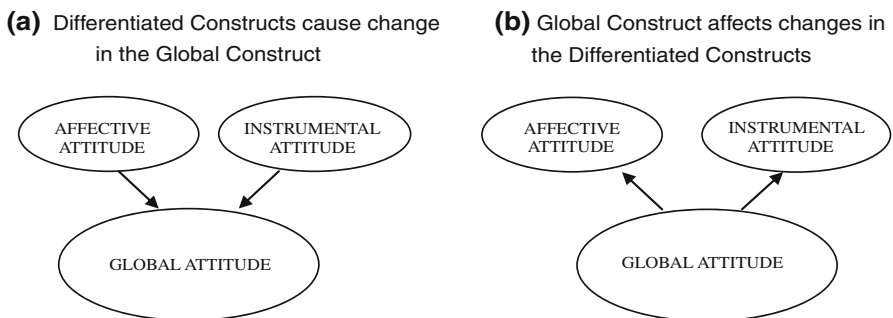


Fig. 1 **a** Example construction of a causal-indicator model and **b** effect-indicator model using first- and second-order constructs

behavior intentions ($N = 596$). It is important to note that although Hagger and Chatzisarantis preferred the effect-indicator model conceptualization of the TPB, they did not create a causal-indicator model to empirically test its model fit against a causal-indicator model of the TPB.

Study Rationale

The present study expands health behavior literature by empirically testing whether the causal-indicator model or the effect-indicator model is the better conceptualization for modeling adolescent's intentions to use condoms. There is a void in the health behavior literature regarding a comparison of these two models using the same sample and same behavior. Therefore, the present study will empirically analyze both models using the same sample and target intention: condom use.

There are several reasons why the present application offers unique contributions beyond previous research and is needed. First, previous research has supported both the causal-indicator model and effect-indicator model applied to the theory of planned behavior, but there has been no empirical study comparing the two conceptualizations using the same sample and same intention. In other words, support for either conceptualization (effect-indicator TPB and causal-indicator TPB) being superior over the other is truly unknown if both conceptualizations are not explored simultaneously. For instance, research confirming that the causal-indicator model of TPB is a satisfactory model may have yielded better results if the model was constructed according to an effect-indicator model, and vice versa.

Second, because it is widely accepted that intentions are a strong predictor of various health behaviors (Albarracin et al. 2001; Ajzen 2002; Ajzen and Fishbein 1980; Ajzen and Madden 1986; Conner and Armitage 1998), it is important to understand the most probable process by which an intention is created given one's attitude, subjective norms, and perceptions of control. Should interventionists focus on changing the general attitude, subjective norms, and perceived control within the adolescent, or should they strive to influence deeper, more specific constructs related to TPB when they endeavor to increase adolescent condom use?

Third, in the broader context of applying the theory of planned behavior to real data, researchers will benefit from such an investigation by creating accurate model parameters that better reflect these social cognitive antecedents of behavior. A clear construction of how the theory operates is imperative in evaluating a theory-based intervention. The present study also contributes to the utility of attitude, subjective norms, and control (theory of planned behavior) in influencing condom use intention for African American adolescents; these components have been speculated to operate differently based on specific populations and behaviors (Bollen and Lennox 1991; Jemmott et al. 1998; Miller et al. 2004).

Because this theory can explain why people come to behave the way that they do with regard to health, it simultaneously gives researchers a basis for explaining behavior change and practitioners a basis for implementing behavior change through intervention. Practitioners often struggle with which intervention components to target so that real behavior change will occur. Primary prevention is crucial for adolescent behavior, especially that of sexual risk and protection, given that it is

most likely that one-third of U.S. men and women diagnosed with HIV/AIDS in 2006 contracted the infection between 12 and 21 years old (Centers for Disease Control and Prevention [CDC] 2007). It would be most efficacious to target early adolescents before they become sexually active or before they decide to engage in unprotected intercourse. However, because early adolescence is a time where responsibilities and social patterns are being established, intervention strategies are worthwhile for influencing adolescents even if they have already begun these risky behaviors. The present study aims to restore confidence in the TPB as a useful theory-based prevention ideology by using a sample of African American adolescents with a high percentage who intend to have sex within the next year. Thus, we are able to assess whether these adolescents intend to engage in protected intercourse (i.e., condom use). This may have important implications in dealing with adolescent sexual behavior, such as increasing intentions to use condoms.

Using attitude toward condom use, subjective norms about condom use, and control over condom use to influence intention, we hypothesized that observed data would fit the effect-indicator model beyond that of the causal-indicator model. 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 do not reflect the true nature of the differentiated constructs and, in fact, represent an inflated contribution within the causal-indicator model. The differentiated constructs will contribute uniquely to the global constructs if and only if the correlation between the differentiated constructs is low and not specified in the model; otherwise, the effects of one differentiated construct will be subsumed by the other. Therefore, statistically, the effect-indicator model is preferred because the differentiated constructs are not orthogonal, are positively correlated, and thus may be subsumed by global constructs, given that the within-construct correlation exceed the between-construct correlation. On the other hand, 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 and independently influencing the global construct, thus favoring the causal-indicator model.

Method

Participants

The study sample consisted of 462 African American adolescents ages 12–17 who were recruited from a Midwestern U.S. city and its surrounding areas. Fifty-six percent of the participants were female ($n = 250$). Forty-seven percent ($n = 217$) of the adolescents were in the ninth grade at the time of administration, 28% ($n = 129$) were in the tenth grade, and 25% ($n = 116$) were in the eleventh or twelfth grade. No socio-demographic variables were collected from the youth; however, the area in which they were recruited primarily was a low income African American community. These adolescents participated in the Youth Empowerment Project (YEP), which was a series of risk reduction, skill building classes. Sixty percent

($n = 268$) of participants reported no previous risk reduction classes. Sixty-four percent ($n = 296$) of the adolescents reported that they *intended* to have sex within the next year. The present analysis uses initial baseline data from the YEP project.

Measures

The YEP survey used in this study was created with specific recommendations for utilizing the theory of planned behavior (Jemmott et al. 1998). The YEP survey, administered at the start of the program session, included 274 questions. These items, the majority of which used a 5-point Likert scale, were divided into various subsets, assessing the adolescents' sexual cognitions, HIV/AIDS knowledge, and self-perceptions, as well as many other health and risky behavior variables. The present analysis used the condom use variables in the sexual cognitions subscale of the survey. This subscale consisted of 71 items. The first part of the sexual cognitions subscale asked questions about how adolescents perceive approval from others on the issue of sex. The second part of the sexual cognitions subscale made statements about attitudes toward sex to which the adolescents were asked to agree or disagree. A final section of the subscale asked about how easy or accessible it is for them to have sex or obtain resources for sexual relations (e.g., acquiring condoms). Some example questions asked, "Would your sexual partner approve or disapprove of your using a condom if the two of you have sex in the next 3 months?", "Sex wouldn't feel as good if my partner and I used a condom", and "It is hard to get condoms". Although the survey contained various types of sexual behavior items, only questions pertaining to condom use were utilized for the present study. Specific attention was given to the condom use variables so that the implied association to the adolescent's intent to use condoms could be evaluated. Various aspects of condom use (e.g., attitude toward condom use, subjective normative values held regarding condom use, etc.) exist within an adolescent's social cognitions regarding the behavior and were employed for the present analysis. An alpha coefficient of .89 indicated sufficient reliability of the sexual cognitions subscale.

Procedure

The YEP survey administration was approved by the Wichita State University Institutional Review Board. Adolescents were targeted using radio and newspaper ads within the surrounding African American community. Upon recruitment, adolescents as well as their parents were given an informed consent and notified that all information would be kept confidential and used only as group or aggregate data. They were told about the YEP project and its goals. They also were 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 as a pledge from us to increase their assurance that the findings would not be reported to their parents and that their survey contained no personal identification. This was done as a special measure to help reduce social desirability. The behavioral contract encouraged the adolescents to respond honestly to the

survey's very personal questions and reiterated that their responses would be kept confidential and away from parents.

Analysis Procedure

The present analysis 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. First, principle components analysis was used in order to reduce the condom use variables into the six proposed constructs (components). Manifest variables that would indicate attitude (affective attitude and instrumental attitude), subjective norms (injunctive norms and descriptive norms), and control (controllability and self-efficacy) were examined; two manifest variables were used to indicate intentions to use condoms. Results of the principle components analysis and, subsequently, the condom use items chosen for inclusion in the structural equation model (SEM) are presented in Table 2. Second, items congruent with theory and with factor loadings of .6 and higher were chosen and were not disconfirmed through confirmatory factor analysis procedures. This ensured the adequacy of a measurement model. Data were also evaluated according to various statistical considerations for structural equation models (SEM), such as sample size requirements, identification of the model, and low measurement error. A structural model of the theory of planned behavior was then constructed using intention to use condoms as the endogenous latent outcome. Next, observed data were imposed onto the model for fit. Last, both models were compared using appropriate fit indices.

Results

Preliminary Analysis

After data reduction using principle components analysis, 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) and analyzed using a random subset of the sample ($n = 231$). Items with an adequate structure loading and that were 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 = .05. Cronbach's alpha statistic was used to calculate the internal consistency of the factor items. All factor items exhibited adequate reliability, as reported in Table 3.

Structural Models

Two structural models were constructed: the causal-indicator model and the effect-indicator model. Structure for the causal-indicator model indicated that paths from the first-order differentiated constructs flow directly into the higher-order global constructs. This imposed a conceptualization that global constructs were indicators of the differentiated constructs. Residual variances among the global constructs

Table 2 Condom use variables and principle components factor loadings used for CFA and SEM analysis

Factor	Items	Factor loading
Affective attitude	Sex is unnatural with condoms	.853
	Condoms ruin the mood	.813
	Condoms break the rhythm	.768
	Condom use means you are promiscuous	.749
	Sex good with condom use	.700
Instrumental attitude	Condoms prevent pregnancy	.879
	Condoms prevent AIDS	.818
	Condoms prevent STDs	.811
Descriptive norms	Mother approves the use of condoms	.893
	Father approves the use of condoms	.845
	Friends approve the use of condoms for themselves	.805
	Partner approves the use of condoms for themselves	.789
Injunctive norms	Importance of mother's opinion	.888
	Importance of partner's opinion	.783
	Importance of father's opinion	.783
	Importance of friends' opinion	.666
Perceived controllability	It is too much trouble to carry condoms	.840
	It is hard to get condoms	.831
	If I have a condom, my partner would not like	.830
	Using condoms mean no trust	.735
	I will break up with partner if s/he use condom	.649
Self-efficacy	Partner can use condom without ruining mood	.796
	I am sure that I can use condoms with sex	.787
	Can say to partner use condom	.785
	Can talk to partner about condoms before sex	.763
	Can use condom in the dark	.690
Intention	Do you feel you will use a condom if sex in the next 3 months	.828
	I plan to use a condom if sex in the next 3 months	.719

Table 3 Internal consistency of construct items

Factor	Cronbach's α
Affective attitude	.90
Instrumental attitude	.85
Descriptive norm	.95
Injunctive norm	.82
Perceived controllability	.77
Self-efficacy	.90

were correlated. In accordance with Rhodes and Courneya's (2003) commonality model for a general factor, all global constructs were modeled to directly influence intention, the endogenous latent construct under investigation. In contrast, structure for the effect-indicator model indicated that paths from the higher-order global constructs flow directly into the first-order differentiated constructs. This conceptualization questions the notion that the global constructs are linear combinations of the differentiated constructs and allows for shared variance in the differentiated constructs. Like the causal-indicator model, all global constructs were modeled to directly influence intention; the global constructs were correlated amongst one another.

SEM Considerations

One rule of thumb found in the structural equation modeling 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; thus, a sample of 446 cases is in congruence with the sample size consideration. The resulting structural model utilized multiple indicators of the six latent variables: (a) affective attitude was measured using five indicators, (b) instrumental attitude was measured using three indicators, (c) descriptive norms was measured using four indicators, (d) injunctive norms was measured using four indicators, (e) perceived controllability was measured using five indicators, (f) self-efficacy was measured using five indicators, and (g) intention was measured using two indicators. Although three or more indicators is generally appropriate 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 highly correlated, $r = .75$. In addition, low measurement error may be concluded from the high and moderate Cronbach's alpha values of the items (see Table 3). Thus, the data was congruent with the consideration of low measurement error.

Hypothesis Testing

According to all fit indices, the effect-indicator model reported better values than the causal-indicator model. Table 4 compares the fit indices of the effect-indicator model to those of the causal-indicator model. The effect-indicator model resulted in $\chi^2 = 954(338)$, $p < .05$. The CFI (comparative fit index) was .911, which indicates that 91.1% of the covariation in the data could be reproduced by the hypothesized model. The NNFI (non-normed fit index) was .896, which indicates that the hypothesized model improved fit by almost 90% when compared to the null model while penalizing for model complexity. Corresponding with the liberal cutoff of .80, the hypothesized model exhibited reasonably good fit according to the NNFI. The RMSEA (root mean square error of approximation) was .057. This indicates the discrepancy or lack of fit per degrees of freedom, a fit measure based on the hypothesized covariances versus observed covariances while penalizing for model

Table 4 Effect-indicator model and causal-indicator model fit indices

Model	χ^2	CFI	NNFI	RMSEA	PNFI	AIC
Effect-indicator	954(339)*	.911	.896	.057	.801	1,145.969
Causal-indicator	1,528.633(353)*	.803	.774	.09	.661	1,694.663

CFI comparative fit index, NNFI non-normed fit index, RMSEA root mean square error of approximation, PNFI parsimony normed fit index, AIC Akaike information criteria

* $p < .05$

complexity. In other words, the RMSEA controls for an inflated degrees of freedom. Using the more liberal cutoff of .06 (Hu and Bentler 1999), the hypothesized model exhibited moderate fit according to the RMSEA. The PNFI (parsimony normed fit index) was .801. 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 improved fit by 80.1%. Lastly, the Akaike information criterion (AIC) resulted in a value of 1,145.969, and in model comparison, the lower AIC value indicates the preferred model. Furthermore, the chi-square difference test results in $\chi^2 = 574.63(14)$, $p < .05$. Although both models accounted for sizeable covariation, the effect-indicator model is significantly different in terms of its ability to account for covariation when compared to the causal-indicator model. The chi-square test of difference as well as the reported fit indices demonstrates convincingly that the effect-indicator model is superior. Table 4 shows the fit indices for the effect-indicator model and the causal indicator model.

With regard to the effect-indicator model, when affective and instrumental attitude were regressed on the exogenous latent variable attitude 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.¹ Both were statistically significant at the .001 level. In other words, adolescents who had important others who thought they should use condoms also perceived that those important others believe that condoms are good; likewise, they also perceived that others important to them use condoms. When perceived controllability and self-efficacy were regressed onto the exogenous latent variable control, the resulting estimates were $-.184$ and $.837$, respectively. Both were statistically significant at the .001 level. In other words, adolescents who believed that they had adequate control of condom use strongly believed that they had the situation specific self-confidence to use a condom; however, they seemed to perceive that they did not have the resources to control their condom use. Furthermore, attitude was not a significant influence on intention (attitude-intention, $\gamma = .020$, *ns*). However, subjective norms and control showed a significance influence on intention (subjective norm-intention, $\gamma = .544$, $p < .05$ and control-intention $\gamma = .627$, $p < .001$). Figure 2 illustrates the SEM of the augmented theory of planned behavior using differentiated and global constructs.

¹ Unstandardized values are given to reflect absolute effects on the dependent variable. When utilizing a non-normed population (e.g., African American adolescents), researchers usually want to compare absolute effects since different groups may have different means and variances.

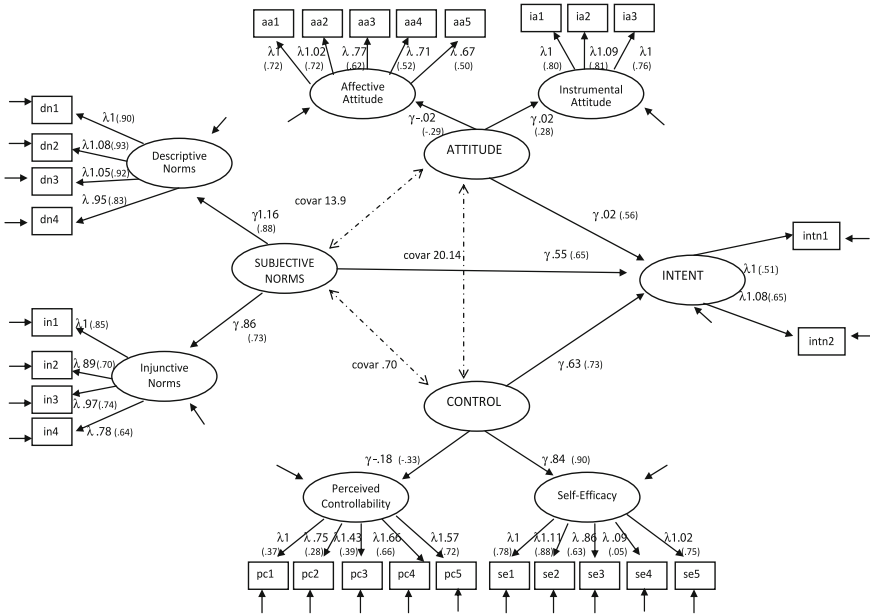


Fig. 2 Second-order structural equation model of the effect-indicator model of the theory of planned behavior using intent as the endogenous latent outcome (Standardized values in parentheses). [γ Attitude \rightarrow Intention, ns; γ Subjective Norm \rightarrow Intention and γ Control \rightarrow Intention, $p < .05$; all others, $p < .001$.]

With regard to the causal-indicator model, when attitude was regressed on the exogenous latent variables affective and instrumental attitude, 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; both estimates were significant at the .05 level. When control was regressed onto the exogenous latent variables perceived controllability and self-efficacy, neither estimate was statistically significant. Attitude showed no significant influence upon intention. Within the causal-indicator model, subjective norms were found to have a significant influence upon intention (subjective norms-intention, $\gamma = .223, p < .01$), and control was also found to have a significant influence upon intention, control-intention ($\gamma = .637, p < .01$).

Discussion

The present results are consistent with Hagger and Chatzisarantis’ (2005) findings that the effect-indicator model was shown to account for significant variance in intention. The difference between the two models tested was indeed statistically significant, which indicates that the effect-indicator model accounted for and had a greater ability to predict condom use intentions. A plausible explanation may be the way in which attitude, subjective norms, control, and their differentiated

components operate within each model. Within the *effect-indicator model*, the differentiated components acted as indicators of their global constructs (attitude, subjective norms, control). This implies that as the global construct increased, the sub-component should simultaneously show an increase. On the other hand, the *causal-indicator model* contended that the differentiated components directly influenced their global constructs. This suggests that a change in one sub-component (e.g., affective attitude) could influence the global construct (e.g., attitude) without a change in any other sub-component (e.g., instrumental attitude).

Modeling global constructs as dependent on the differentiated components does not make substantive sense if the differentiated components share variance. For example, in the causal-indicator model, both instrumental attitude and affective attitude are supposed to exert some incremental influence upon global attitude. In this case, global attitude would contain variance from both instrumental and affective attitude, but if instrumental and affective attitude are highly correlated and share variance (which they do), then global attitude results in a bias, an inflated estimate of the contribution of its differentiated components. 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 on 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 and Lennox 1991; Browne and MacCallum 2003a). However, this would not be the case based on the nature of the global constructs (attitude, subjective norms, and control) 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 components 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.

Implications for Theory

The present study served as a contribution to the theory of planned behavior literature in that the weight placed on subjective norms or attitudes vary across populations (i.e., African American adolescents). Consistent with prior research, which contends that control is an optimal influence of intention (Ajzen 2002), control was found to have the ultimate influence on intention with regard to sexual behaviors and African American adolescents. Furthermore, Ajzen contends that both perceived controllability and self-efficacy are best subsumed by the global construct control, but the effect-indicator model found that as control increased, self-efficacy increased (standardized $\gamma = .900, p < .001$), but perceived controllability decreased (standardized $\gamma = -.333, p < .001$). This suggested that an African American adolescent's self-reported control coincides with the perception of decreased availability 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 control upon perceived controllability and self-efficacy, as self-efficacy has a much stronger weight than perceived controllability. Overall, self-efficacy seems strong in African American adolescents regarding the ability to use condoms, but it is unclear how perceived controllability is being interpreted by youth.

In addition, the coefficient alpha for descriptive norms was extremely high, which may be traditionally suggestive of redundant items. However, the descriptive norms items asked adolescents about whether they believed condom use was performed by specific important others: mother, father, friends, and partner. Each item indicating an “important other” is intended to reflect a certain belief about that specific individual. Because the adolescents answered so consistently across individuals (i.e., mother, father, friends, and partner), is it that these adolescents do not distinguish among specific others when it comes to issues involving sexual behavior? Or is it that when an adolescent believes one important other in his/her life (e.g., mom) endorses the use of protection, it is simply extremely likely that he/she will believe that all important others (e.g., dad, partner) do the same?

Regarding the theoretical analysis of the present study, experimental tests are needed. This may be done by randomly assigning adolescents to a condom-use intervention that focuses on the global components, attitude, subjective norms, and control and then randomly assigning adolescents to a condom-use intervention that focuses specifically on the differentiated components. The two groups would then be compared to a non-intervention group and evaluated based on which group had the strongest data to support whether global constructs influence intentions by way of influencing differentiated constructs or being influenced by the differentiated constructs. Although Webb and Sheeran (2006) conducted a meta-analytic review of experimental studies to assess the intention-behavior relationship, no previous literature has conducted an experimental study to assess the differences in construct conceptualization (effect-indicator versus causal-indicator model) regarding its relationship to intention and behavior. Such an investigation would lend further evidence to the more superior conceptualization. In addition, because there is the potential for intentions to be confounded with their antecedents, a follow-up measure of actual condom use would allow investigation of the full theory of planned behavior model. Although the theory is in question only if attitudes, subjective norms, and control are unable to influence intention, adding a follow-up measure would strengthen intentions as a predictor of actual behavior, provided that the actual behavior is not greatly separated from the intention in temporal sequence (e.g., 1-month follow-up).

Implications for Intervention

The theory of planned behavior could have important implications for community programs that implement social cognitive interventions for African American adolescents. Interventions that engender greater changes in intention also produce greater impacts on behavior (Webb and Sheeran 2006). In addition, interventions utilizing the theory of planned behavior are likely to be most successful in changing/influencing intention (Webb and Sheeran). Attitudes are known as the overall

evaluation of an object, concept, or behavior (Ajzen 2001). In influencing the attitudes of adolescents, it is important to note that any type of change in the overall evaluation of performing a behavior (e.g., condom use) will have an impact of whether he or she feels that the behavior is enjoyable and/or beneficial.

The overall attitude about using condoms can influence the intention to use condoms through prior exposure, cognitive load, direct and indirect experience, and habit formation (Kashima et al. 1994). Making adolescents aware and familiar with condoms may moderate positive attitude activation (Ajzen 2001). If the variance in intention is indeed composed partly of attitudes, prevention programs may work to strengthen the importance of having a positive attitude about condom use. In addition, prevention and safer sex programs may find that influencing subjective norms may be more beneficial for African American adolescents. Subjective norms refer to whether the adolescent believes that important others think he or she should carry out the behavior, not necessarily whether important others actually carry out the behavior. Although Sheeran et al. (1999) found that attitudinally controlled intentions are an expression of one's self and are undertaken with a full sense of choice and normatively controlled intentions are experienced as pressure or coerced and thus have poorer motivational impact, African American adolescents may simply value guidance more in the form of what they believe their important others think they should do when considering a behavior. We propose that normatively controlled intentions are also undertaken with a full sense of choice with regard to African American adolescents.

It has also been found that parents may serve as a greater influence in the conceptualization of subjective norms within the TPB (Hutchinson 2002; Hutchinson and Cooney 1998; Miller et al. 1998). The cultural aspects of African American adolescents may impact the way they perceive these social influences to be beneficial, especially when their influences come from parents or other favored authoritative figures. In the case of increasing self-efficacy in 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.

Limitations

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. An equivalent model is an SEM that has different parameters, but the overall covariance matrix fits the data equally well. 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 and MacCallum 2003b; Kline 1998; Sprites et al. 1998). Based on the considerations of equivalent models (Browne and MacCallum 2003b), there are approximately 81 augmentations of the TPB that would reproduce the variance in intention just as well as the effect-indicator model.

Other limitations also are noted. First, 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 researchers to exert more meaning upon the latent concept and place theoretical constraint within the model. Second, an indication of past condom use behavior would add to the theoretical power of the TPB in influencing intention, although no measure of previous condom use was assessed in the present study. Past condom use behavior implies that a person is familiar with certain resources needed to carry out condom use (Ajzen and Fishbein, 1980; Bentler and Speckart 1981; Frederick and Dossett 1983; Manstead et al. 1983; Kashima et al. 1994). Third, the present analysis did not examine whether the differentiated constructs have substantial direct effects upon intention. As some of the differentiated constructs have been individually found to influence intention, it is conceivable that variation may be explained by the differentiated constructs when tested in a full model of TPB.

Lastly, the present study consists of a cross-sectional measure of attitude, subjective norms, and perceived behavioral control assessed congruently with intention. Due to the cross-sectional nature of the study and lack of experimental data, it is difficult to imply any causality as to how exactly the global constructs are causing change in the differentiated constructs, or vice versa. Rather, we simply acknowledge that modeling the theory of planned behavior in terms of its global constructs may be more beneficial in intervention efforts aiming to increase condom use and condom use intentions.

Conclusion

Future research may model other less complex behaviors (e.g., non-partnership behaviors) using the effect-indicator and causal-indicator models. 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 their respective intentions.

TPB was not disconfirmed as a suitable model for African American adolescents' regarding condom use. Interventions may benefit by focusing on adolescent behavior change with regard to the global components in order to influence more specific concepts of these social cognitions. Risk reduction interventions serving primarily African American adolescents will benefit by focusing on behavior change with regard to overall subjective norms and self-efficacy. Knowledge about how these constructs operate is essential for tailoring such preventative adolescent interventions.

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