Guidelines for Construct Measurement Yielding Unexpected Higher-Order Constructs: An Application for the Theory of Planned Behavior Applied to Condom Use

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Abstract

The theory of planned behavior (TPB) is useful theory in social science for explaining how people arrive at an intention to act. Previously, distinctions were found among the global theoretical constructs (attitudes, subjective norms, and volition). As such, six higher-order constructs, or *differentiated constructs*, were identified. The research investigation intended to validate the use of the TPB differentiated constructs for construct measurement, which is useful for latent variable models. Results based on studies using latent variable methodologies are at fault for improper measurement specification which may call into question the implications of the research. Using Bollen and Lennox's conventional guidelines for construct measurement, survey data obtained from 446 African American adolescents about their condom use beliefs was used to explore the applicability of the first conventional guideline for construct measurement: establishing linear combinations of construct items with the use of principal axis factoring. Secondary analyses examined the four remaining guidelines. The six hypothesized constructs identified were: affective and instrumental attitude, descriptive and injunctive norms, perceived controllability, and self-efficacy. Surprisingly, results indicated three additional constructs, not previously explained by the theory: negative affective attitude, corollary condom use attitude, and partnership self-efficacy. These findings highlight not only the need to apply such guidelines to all research analyses involving construct measurement where appropriate, but also illustrate how unexpected findings through analytical best practices can expand and modify existing theoretical conceptualizations.

Keywords

Theory of Planned Behavior, Higher-Order Constructs, Condom Use, Self-Efficacy

1. Introduction

The theory of planned behavior (TPB) [1] is one of the most widely used theories in the behavioral sciences [2]. It has found utility in preventative health behaviors such as diet and exercise [3], [4], cancer screenings [5], drug use [6], and sexual behaviors [7], [8]. The theory of planned behavior is

useful for explaining how people arrive at an intention to act and subsequent behavior. The TPB posits that an intention to act is the proximal predictor of behavior. The variance in intention is composed of three global psychosocial constructs: 1) attitudes, 2) subjective norms, and 3) volition. Attitudes are a product of behavioral beliefs, which are overall evaluations of whether the behavior is "good" or "bad" and based on outcome expectancies. Thus, attitude can be described as the degree to which performance of the behavior is positively or negatively valued. Subjective norms describe a social cognitive process at which an individual evaluates whether he or she believes that important others think he or she should perform a particular behavior; and are products of normative beliefs weighted by one's motivation to comply. Volition (i.e. perceived control) encompasses one's perceived capacity to perform a particular behavior and originates from control beliefs and perceived power. Theoretically, intention should always predict behavior to the extent that the behavior is under a person's direct control. It is important to note that the theory is not invalidated when intention fails to predict behavior; it is only problematic when the psychosocial antecedents, attitude, subjective norms, and volition, fail to predict intention [1].

Distinctions have been found among the global psychosocial constructs (attitudes, subjective norms, and volition) of the TPB, as some of the variance in intentions remained unexplained by the global constructs alone [9]. As such, sub-components of the global constructs, known as differentiated constructs, were identified that better explain the variance within attitudes, subjective norms, and volition [10]-[12]. Statistically, these differentiated constructs are supported by empirical evidence and meta-analysis indicating that they may better explain change in the global construct's influence on intention [10]-[19].

1.1. Differentiated Constructs of the TPB

ATTITUDES: AFFECTIVE AND INSTRUMENTAL ATTITUDES. The differentiated constructs of attitude are affective attitude and instrumental attitude. They have been observed as distinct constructs [10], [19]. 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). It has been argued that even though affective attitude and instrumental attitude share variance [20], they are more distinguishable at the subordinate level [17].

SUBJECTIVE NORMS: DESCRIPTIVE AND INJUNCTIVE NORMS. The differentiated constructs of subjective norms are descriptive norms and injunctive norms which were found to be distinct and exhibit divergent validity [10]-[12], [19]. Injunctive norms are measured as a behavior that one feels is important to significant others. Descriptive norms are measured as a behavior that is performed or endorsed by significant others. Conceptually, both forms are perceived as a type of social influence.

VOLITION: PERCEIVED CONTROLLABILITY AND SELF-EFFICACY. Reference [10] formally introduced two distinct types of volition: perceived controllability and selfefficacy. Perceived controllability is the extent to which an individual has access to the means of control with regard to a behavior. Self-efficacy is an individual's situation specific self-confidence for engaging in the behavior [19].

1.2. The Present Study

The present research investigation intended to substantiate the use of the differentiated constructs of the TPB for construct measurement, which would be useful for latent variable models such as confirmatory factor analysis and structural equation modeling. Latent variables, as opposed to observed variables, are variables that are not directly observed but rather, are mathematically inferred from observed variables. Adequate construct measurement is a measureable property of latent variable models that denotes that the latent variable captures the expected relationships between the observed variables (also known as indicators or indicator variables) and the latent variable to which it belongs [21]. Previously, an established set of conventional guidelines for construct measurement have been put forth in the literature [22]. The first and most essential guideline for construct measurement is that the linear combination of each construct should correspond to its own respective principal component. Given a set of observations that are expected to measure various aspects of a behavior (e.g. affective attitude), a principal component is a linear combination of observations (i.e., items) where the variance within the linear combination is maximized beyond all other possible linear combinations of observations. Empirically, this would indicate that the observed items belonging to a particular principal component share maximum within-construct variance. Conceptually, the identification of principal components is important in establishing that a latent variable is indeed measuring what it is purporting to measure and that it is distinct among other latent variables.

The differentiated constructs of attitudes, subjective norms, and volition were examined with regard to condom use beliefs using a previously validated, self-report, adolescent survey. The TPB has been extensively used in research endeavors aimed at increasing condom use behavior [23]- [26]. Theory-based interventions utilizing the TPB may choose to evaluate findings with analytical procedures such as structural equation modeling in order to empirically confirm or modify theoretical relationships that influence behavior change. Therefore, the constructs continue to merit attention from behavioral interventionists and social science researchers alike.

Thus, the primary hypothesis of the present study stated that the linear combination of each differentiated construct, regarding condom use beliefs, would correspond to its respective principal component [22]. This would also indicate that the global constructs are better subsumed by their differentiated construct pair. Additionally, the present study examines the remaining four conventional guidelines for construct measurement: that the construct indicators should be internally consistent, there are optimal magnitude of correlations among the construct items, within-construct correlations should exceed between-construct correlations, and that validity is evident, which is assessed by the nature of the specified construct and the adequacy with which the construct is measured.

2. Methods

2.1. Participants

The sample consisted of 446 African American adolescents, ages 12-17 (M=14.3 years old, s=1.5 years). All participants (100%) identified with African American race, however 19.5% (N=87) reported multiple-race status along with African American. Male adolescents (N=196) comprised 44% of the participants and female adolescents (N=252) comprised 56% of the participants. Thirty-seven percent (N=164) of the sample reported having had sexual intercourse, and <1% (N=8) identified as gay/bisexual. Of those sexually active, 72% (N=119) indicated that they were familiar with condom use.

2.2. Measures

The instrumentation for the present study used the condom use beliefs subsection of a larger 274-item adolescent survey instrument. Items comprising the condom use beliefs subsection were developed with specific recommendations for utilizing the TPB [27]. The condom use behavior subsection included 37 items, which were set to the fivepoint Likert-like scale. The items assessed the adolescents' condom use attitudes, norms, self-efficacy, and perceived control regarding condom use, and condom use intentions. Due to the nature of the sexual behavior items, there were two gender-specific versions of the survey (e.g. "I can put on a condom in the dark" for males, and "I can put a condom on my partner in the dark" for females). The entire survey took approximately 25 minutes to complete. Table 1 shows the condom use items used for the present analysis.

2.3. Procedure

The research was approved by the university's Institutional Review Board. Radio advertisements were used to recruit African American adolescents for participation in a healthy lifestyle program aimed at teaching adolescents about healthy eating, diet and exercise, drug use knowledge and awareness, pregnancy prevention, and sexually transmitted infection (STI) knowledge and prevention. Upon recruitment, adolescents and their parents were briefed about the program goals, namely health promotion. They were also informed that they could discontinue participation for any reason at any time. Informed consent was obtained from all individual participants included in the study. 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 used only as group or aggregate data. The behavioral contract encouraged the adolescents to respond honestly to the survey's very personal questions and reiterated that their responses would be kept completely confidential and away from parents. Parents were not present during the program activities. nor were they present during survey administration.

Trained facilitators conducted the four-hour healthy

lifestyle program sessions at the local university. The sessions were held on Saturdays with groups of 50-60 students per session. The program sessions consisted of indepth discussions, class exercises and other demonstrations, role play, and videos. The adolescents were surveyed before and after the sessions and were given a \$40 gift card for their participation following the post-session survey completion. The present study uses only the baseline data of the condom use behavior subsection.

2.4. Analytic Procedure

The primary analysis explored the applicability of the first conventional guideline for construct measurement [22]: 1) establishing linear combinations of construct items with the use of principal axis factoring. Secondary analyses reported the results of the four remaining guidelines for construct measurement: 2) construct indicators should be internally consistent, 3) optimal magnitude of correlations among the construct items, 4) within-construct correlations must be greater than between-construct correlations, and 5) validity, assessed by the nature of the specified domain and the adequacy with which the domain is measured [22].

For the primary analysis, principal axis factoring (PAF) was used to extract components with eigenvalues greater than one that were assumed to reflect the six differentiated components (affective attitude, instrumental attitude, descriptive injunctive norms, norms, perceived controllability, and self-efficacy) from the 37-item condom use beliefs survey, using SPSS 23. Components were extracted using promax (oblique) rotation in order to relax the orthogonality constraint and gain simple interpretation. PAF was then applied to explore the components and obtain factor loadings and interpretation. Factor loadings were considered meaningful to a factor if it exceeded .40 on a single factor and <.40 on all other factors [28]. For the purpose of this study, component and factor may be used interchangeably.

Secondary analyses were composed of four additional succinct analyses to support the use of the condom use beliefs survey in construct measurement. For conventional guideline #2, Cronbach's α was used to calculate the internal consistency of the factor items. For conventional guideline #3, a pairwise Pearson's correlation was conducted to observe the correlations among each construct item separately. Conventional guideline #4 stated that withinfactor correlations should exceed between-factor correlations. 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. To evaluate the fourth conventional guideline, inter-item correlations were averaged for each factor to obtain an average within-factor correlation magnitude; afterward, all factors were correlated with one another to obtain between-factor correlations. For each

factor, the within-factor correlation was then compared to its between-factor correlations. Conventional guideline #5 addressed the validity of the construct items and the adequacy with which the domain is measured. The condom use subsection survey was intended to sample the theorybased facets of the multi-dimensional construct, condom use, as it pertains to the TPB constructs. In addition to face validity, this may be conceptualized by analyzing the results of the PAF and observing *clusters* of highly loading items for each construct (i.e. affective attitude, instrumental attitude, descriptive norms, injunctive norms, perceived controllability, and self-efficacy) of condom use beliefs.

3. Results

The research investigation evaluated whether the condom use subsection survey was empirically adequate for construct measurement according to the conventional guidelines for construct development. The primary analysis tested the first conventional guideline. It was hypothesized that six differentiated components of the TPB would emerge.

3.1. Conventional Guideline 1: Principal Components

The primary hypothesis was supported. PAF detected the six differentiated constructs. However, after examination of the scree plot and noting that there were three additional eigenvalues that exceeded 1.0, it was observed that the survey was suggesting that there were nine differentiated constructs contained within the data, as opposed to the six differentiated constructs previously explained (i.e. affective attitude, instrumental attitude, descriptive norms, injunctive norms, perceived controllability, and self-efficacy). All items loaded meaningfully. Table 1 shows the factor loadings for the six differentiated constructs hypothesized as well as the additional three constructs that will be explained below.

The six hypothesized constructs identified were: affective attitude (factor one), instrumental attitude (factor two), descriptive norms (factor three), injunctive norms (factor four), perceived controllability (factor five), and self-efficacy (factor six). Because the results indicated the possible existence of three additional constructs, an ad hoc PAF analysis was performed given the unexpected results. In addition to the aforementioned six constructs, an additional distinction of affective attitude, instrumental attitude, and self-efficacy emerged. Positive affective attitude (factor one) was statistically unique from negative affective attitude (factor seven); when requesting the original six hypothesized constructs, these factor items were all subsumed under affective attitude. An eighth factor captured consequences of lack of condom use and was termed "corollary condom use attitude" (factor eight), which was subsumed by the instrumental attitude factor. The PAF also identified items that measured specifically "partnership self-efficacy" (factor nine) as a principal component, which was previously subsumed by the self-efficacy factor.

Given the expected finding of the three additional

constructs, an exploratory factor analysis (EFA) model with the six differentiated constructs, as well as a second model using the nine differentiated constructs, was constructed using Amos 22 to obtain fit statistics and evaluate accordingly. The EFA using the six differentiated constructs $x^2 =$ resulted in 2251.658(347), p<.05; CFI=.94; RMSEA=.051; AIC= 2425.658. The EFA using the nine differentiated constructs resulted in $x^2 = 1767(354)$ p<.05; CFI=.97; RMSEA=.050; AIC= 2049.528. A chi-square model difference test was calculated that resulted in a chisquare difference of $x^2 = 484.7(7)$ p<.001. A significant pvalue in the chi-square difference test suggests that the model with additional factors is significantly different from the one with fewer factors. In other words, the additional factors significantly improved the fit to the data. Additionally, in model comparison, the model with the lowest AIC value is usually the preferred model since it minimizes information loss, given that it adds interpretation to the data [29].

3.2. Conventional Guideline 2: Internal Consistency

Cronbach's α , a measure of reliability, was used to calculate the internal consistency of the factor items. All factor items exhibited adequate reliability. Table 2 shows the internal consistency of the factor items.

3.3. Conventional Guideline 3: Construct/Factor Inter-Item Correlations

A pairwise Pearson's correlation was conducted to observe the correlations among each factor item separately. Results showed large to moderate magnitudes of correlations among the factor items. For factor one (positive affective attitude), inter-item correlations ranged from .58-.88. For factor two (instrumental attitude), inter-item correlations ranged from .55-.81. For factor three (descriptive norms), inter-item correlations ranged from .69-.89. For factor four (injunctive norms), inter-item correlations ranged from .67-.79. For factor five (perceived controllability), inter-item correlations ranged from .54-.68. For factor six (self-efficacy), inter-item correlations ranged from .51-.71. For factor seven (negative affective attitude), inter-item correlations ranged from .55-.74. For factor eight (corollary condom use attitude), interitem correlations ranged from .58-.75. For factor nine (partnership self-efficacy), inter-item correlations ranged from .63-.82. The inter-item correlations were strong enough to demonstrate a valid relationship, yet moderate enough to demonstrate the diverse facets of a particular construct, which increased the confidence that the individual items within each construct were not measuring exactly the same thing, but rather, nuanced facets of an underlying construct.

3.4. Conventional Guideline 4: Within- and Between-Construct Correlations

The correlations of indicators within the same construct (factor) should exceed the correlations between constructs. To this aim, the average of the inter-item correlations within each construct was calculated and compared with its correlation between every other factor. For each construct, all averaged within-factor item correlations exceeded the between factor correlations. Table 3 shows the within-construct correlation for each factor compared with its between-construct correlation with every other factor.

3.5. Conventional Guideline 5: 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 axis factoring analysis resulted in clusters of the highly loading items for each construct (i.e. affective attitude, instrumental attitude, descriptive norms, injunctive norms, perceived controllability, self- efficacy, negative affective attitude, corollary condom use, and partnership self-efficacy) of condom use.

Table 1. Factors (Cons	structs) and Factor L	oadings for the Condo.	m Use Behavior Scale.
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Construct Item	I	II	III	IV	V	VI	VII	VIII	IX
Factor 1: Positive Affective Attitude									
Sex still feels good when a condom is used	.79								
Sex is more fun when a condom is used	.74								
My sexual partner would be happier if a condom is used	.65								
All-in-all, it is a good idea to use condoms	.75								
Factor 2: Instrumental Attitude									
Condoms prevent pregnancy		.80							
Condoms prevent AIDS		.79							
Condoms prevent STDs		.72							
I am likely to get pregnant/get a girl pregnant during my teen years if I have sex		61							
without a condom		.51							
If I have sex without a condom, I am likely to get AIDS		.50							
Factor 3: Descriptive Norm									
Friends approve the use of condoms			.75						
Father approves the use of condoms			.79						
Mother approves the use of condoms			.84						
Sex partner approves the use of condoms			.68						
Factor 4: Injunctive Norm									
Importance of partner's opinion				.73					
Importance of mother's opinion				.94					
Importance of father's opinion				.96					
Importance of friends' opinion				.68					
Factor 5: Perceived Controllability									
It is too much trouble to carry condoms					.71				
It is hard to get condoms					.79				
Condoms cost too much					.77				
I can get condoms					70				
Factor 6: Self-Efficacy									
I am sure that I can use condoms with sex						.95			
I can use a condom in the dark						.84			
If I get sexually aroused. I can stop before sex to use a condom						.70			
I can stop sex to get a condom if we do not already have one						.71			
Factor 7: Negative Affective Attitude									
Sex is unnatural with condoms							.86		
Sex wouldn't feel as good if my partner and I a condom is use							.89		
Using condoms is embarrassing							.89		
Condom use means you are having sex with other people							.74		
Factor 8: Corollary Condom Use Attitude									
Condoms break the rhythm								.58	
Condoms ruin the mood								.69	
Saving we should use a condom is like saving to my partner. "I don't trust you."								.72	
If I have a condom, my partner would not like it								.50	
Factor 9: Partnership Self-Efficacy									
I can get my partner to use a condom even if he doesn't want to/I can get my partner									
to agree that we should use a condom even if she doesn't want to									.83
Can talk to partner about condoms before sex									.97
Can say to partner use condom									.96
Partner can use condom/I can get my partner to use a condom without ruining mood									.84

The correlations of items within each construct were moderate and all significant (<.05). 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 [30]-[32]. Upon face validity examination, all items were conceptualized as belonging to its construct definition. Divergent validity was noted in that inter-item correlations were all significant within each factor while all between-factor correlations were non-significant.

4. Discussion

The present study used a TPB-based condom use scale to examine its suitability for construct measurement utilizing the higher order constructs of the TPB (affective attitude, instrumental attitude, descriptive norms, injunctive norms, self-efficacy, and perceived controllability). Indeed, the use of the six differentiated constructs of TPB was substantiated. However, according to our data, three additional constructs were identified. It is important to note that this finding is in agreement with the TPB.

The extensive popularity and usefulness of the TPB is that the theory remains open to expansion given that important and related proximal determinants are detected [9], [18]. We have built upon such expansion efforts by identifying three additional differentiated constructs with respect to the African American adolescent sample used in the present study. The three additional distinctions were uncovered through the use of best practices and construct measurement guidelines.

Overall, the present study contributes to the literature in that it highlights the importance of delineating construct measurement procedures where the construct domains are adequately defined by an established theory. Thus, the present study is necessary 1) as an example of a practical application of the conventional guidelines for construct measurement and 2) preliminary validation procedures for a theory-based condom use beliefs scale that may be utilized by social science researchers and behavioral interventionists wishing to capture and influence condom use guided by the TPB.

Using the conventional guidelines for construct measurement [21], [22] our hypotheses were supported and the condom use beliefs scale showed adequacy for construct measurement. Construct measurement, which is used for various statistical procedures such as confirmatory factor analysis and structure equation modeling, begin with specification of the measurement model to be tested. Previous research has noted that results based on studies using these statistical methodologies are at fault for improper specification of the measurement model which may call into question the implications of the research [21].

4.1. Unexpected Findings and Implications

The condom use subscale of the survey instrument was specifically constructed utilizing the theory of planned behavior and was expected to yield six distinct factors indicating the six differentiated (i.e., higher-order) constructs. Based on the eigenvalues of the principle axis factoring analysis applied, there emerged nine conceptually distinct factors for this sample. Upon examination of the factor items, the additional factors were labeled negative affective attitude, corollary condom use, and partnership self-efficacy.

The items intended to capture the affective attitude

construct were split into a negative affective attitude and (positive) affective attitude. This suggests that positive affective attitude and negative affective attitude can coexist; otherwise, all items capturing affective attitude, both positive and negative, would have loaded onto a single factor with items that denoted negative affective attitude yielding a negative factor loading value. If an item yields a negative factor loading, it is negatively related to the factor [31]. Therefore, it seems as if positive affective attitude and negative affective attitude are separately conceptualized by this sample of adolescents, even though we can observe that they indeed share a negative correlation between them. Negative affective attitudes (factor seven) towards condom use beliefs had higher loadings than positive affective attitudes, suggesting that negative attitudinal aspects of condoms may be more meaningful to interventionists than positive aspects. Attitudes, arguably, are the most widely studied construct in behavioral theories, such as the TPB, social learning theory [33], the integrative model of behavioral prediction [34], attitude formation theory [35], and reference group theory [36]. This poses the idea that one can hold both a positive and negative attitude toward the same target behavior, depending on how the attitude is measured.

Upon examination, items comprising factor eight seemed to measure consequences of condom use, and was therefore named corollary condom use attitude. Instrumental attitude is defined as whether the behavior is beneficial or harmful. Items measuring corollary condom use were previously assumed to load onto the instrumental attitude construct. According to the data, instrumental attitude loaded items such as "Condoms prevent pregnancy," "Condoms prevent AIDS", and "Condoms prevent STIs", which indicate the benefits of condom use. Instrumental attitude also loaded items such as "I am likely to get pregnant during my teen years if I have sex without a condom", and "If I have sex without a condom, I am likely to get AIDS", which indicate the harmfulness of not using a condom. However, corollary condom use attitudes denote the experiential punitive aspects of choosing to use condom (e.g. "Condoms ruin the mood"). It is interesting that the items loading onto the corollary condom use attitudes scale find their utility in the negative aspects of condom use within the context of sexual intercourse with a partner and in partnership perceptions of condom use. Therefore, corollary condom use attitudes contain a social interactive component to them.

Table 2. Internal Consistency of Construct (Factor) Items.

Factor	Name	Cronbach's α
1	Positive Affective Attitude	.90
2	Instrumental Attitude	.85
3	Descriptive Norm	.95
4	Injunctive Norm	.82
5	Perceived Controllability	.84
6	Self-Efficacy	.90
7	Negative Affective Attitude	.87
8	Corollary Condom Use Attitude	.89
9	Partnership Self-Efficacy	.94

Table 3. Within-^a and Between-Construct Correlations.

Construct/ Factor	Positive Affective Attitude (PAA)	Instrumental Attitude (IA)	Descriptive Norm (DN)	Injunctive Norm (IN)	Perceived Controllability (PC)	Self- Efficacy (SE)	Negative Affective Attitude (NAA)	Corollary Condom Attitude (CCA)	Partnership Self-Efficacy (PSE)
PAA	.67	.37	.24	.16	.31	.16	33	24	.17
IA		.62	.17	.07	.15	.40	11	41	.23
DN			.78	.21	.21	.52	27	12	.47
IN				.83	.04	.35	09	10	.23
PC					.68	.14	11	14	.37
SE						.61	28	.13	04
NAA							.64	.13	04
CC								.78	.23
PSE									.77

^a Averaged within-construct correlation on the diagonal of matrix.

There was also a distinction of self-efficacy and partnership-specific self-efficacy. The role of self-efficacy in partnership behaviors was distinct from general self- efficacy. It is important to note that 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 specifically related to a target person's sexual partner were found to directly influence the target person's attitudes, norms, and intentions [37]. Thus, having the selfconfidence to be able to use a condom (self-efficacy) is distinctly different than having the confidence to verbalize the importance or desire to use a condom during sex with a sexual partner.

Interventions aiming to influence the sexual behavior of adolescents may incorporate condom use negotiation. Adolescents could be taught to negotiate condom use with a partner prior to the prospect of any sexual encounter and prior to sex, such as, during the courting phase of their relationship. This would be distinct from teaching them the proper skills and self-confidence involved in condom use. Also noteworthy is that the negative affective attitudes about using a condom were not correlated with partnership selfefficacy. This implies that even if adolescents do not enjoy using a condom, it has little or no bearing on their perceived ability to carry out condom use negotiations.

4.2. Limitations

Limitations should be noted. The present study used crosssectional observations. Only 40% of the adolescents reported being sexually active at the time of assessment. A larger, more representative sample could have affected the results. Therefore, generalizability is limited. Nonetheless, the present study serves as a reference for the theory-based perceptions of this adolescent sample. The data derived here used self-report data on the sexual attitudes, subjective norms, and volition of the adolescents sampled. Although the researchers took measures to reduce social desirability bias by having the adolescents sign a "behavioral contract" that explicitly stated that their answers would not be shared with their parents, there still remains the risk of socially desirable responding. The sample consisted solely of African American adolescents from a Midwestern city, and therefore the results cannot be generalized to other racial groups or adults. More research is needed to corroborate these findings for other African American sub-populations (e.g. urban, southern, young adult).

4.3. Conclusion

Theory-driven research in the behavioral sciences continues to provide community improvement through psychological, social, and ecological intercession. The present study was congruent with previous research that supports the validity of the TPB's differentiated construct in a variety of health behaviors including condom use [12]-[13]. In addition, these finding provide guidance for researchers looking to identify beliefs that should be targeted in TPBbased interventions involving African American adolescents. In addition, researchers who need to reduce the number of scale items, especially for theory-based constructs, can use these findings to make a more informed decision about which items to include. Future research would benefit from testing whether similar adequacy for construct measurement would result from using a different population regarding antecedents of condom use intentions via the TPB. The present study's findings highlight not only the need to apply such guidelines to all research analyses involving construct measurement but also illustrate how unexpected findings through analytical best practices can expand and modify existing theoretical conceptualizations.

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