

## Predictors of condom use in South African university students: a prospective application of the theory of planned behavior

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### Abstract

This study was carried out among university undergraduates in Cape Town, South Africa. Structural equation models were tested with Mplus to predict intentions to use condoms and actual (subsequent) condom use. Theory of planned behavior (TPB) predictors (attitudes, subjective norms, perceived behavioral control) explained 43% of the variance of intention to use condoms among the sexually active sample, and 31% among the sexually inactive. In a separate analysis—which also included intentions and previous condom use as predictors—57% of subsequent condom use among the sexually active students was explained. Moreover, age, religiosity, and relationship status were associated with condom use. Our findings provide support for the applicability and suitability of the TPB in South African student populations.

Recent statistics (UNAIDS, 2010) reveal that the AIDS epidemic in Sub-Saharan Africa has led to the death of 1.5 million people, with South African populations being severely affected by HIV. As is the case elsewhere in the world, South African young adults comprise the highest risk group. It has been estimated that among those aged 20 to 24 (the average age of South African university undergraduates), 15.2% were HIV-positive, as were 23.2% of those age 25 to 29 (Chetty & Michel, 2005; Shisana et al., 2005).

Contrary to popular belief, a university education does not counteract HIV risk-taking activities (Shisana & Simbayi, 2002). The international literature (e.g., Katz, Fromme, & D'Amico, 2000; Kiene & Barta, 2006) has found university students to be at high risk for contracting sexually transmitted infections (STIs) as a result of inconsistent condom use. It has also been estimated that between 6% and 43% of the university population will contract at least one STI, depending on the sample, location, and year (Scandell, Klinkenberg, Hawkes, & Spriggs, 2003). Consequently, studies that empirically clarify determinants of condom use are important precursors of safer-sex interventions, but those using university students as participants are scarce in South Africa.

Unlike studies from the West, very few Sub-Saharan and South African studies have applied theories of social cogni-

tion to the investigation of sexual risk-taking (Protogerou, Flisher, Aarø, & Mathews, 2012). Theories of social cognition assess determinants of condom use by emphasizing the cognitive functioning of the individual, including the socialization processes that contribute to this functioning (for a review, see Conner & Norman, 2005). Of these theories, the theory of planned behavior (TPB; Ajzen, 1991) is the most extensively applied to the study of sexual risk behavior in the Western World, as it incorporates important cognitive variables that explain health and risk activities (Albarracín, Johnson, Fishbein, & Muellerleile, 2001; Sheeran, Abraham, & Orbell, 1999). A recent meta-analysis by McEachan, Conner, Taylor, and Lawton (2011) indicated that the TPB is able to explain 43.3% of the variance in health behavior intentions, and 19.3% of the variance in subsequent health behavior.

The TPB is an extension of the theory of reasoned action (TRA; Fishbein & Ajzen, 1975) and postulates that the principal cause of a behavior is the individual's intention to engage in it. Intentions are determined by attitudes (i.e., favorable/unfavorable evaluations toward the behavior in question), subjective norms (i.e., beliefs about whether significant others approve/disapprove of the behavior), and perceived behavioral control (PBC; i.e., subjective perceptions of the

ease or difficulty of the behavior). Attitudes, subjective norms, and PBC are direct variables of the TPB, which, according to the theory, are determined by underlying salient beliefs (i.e., those most easily accessible from memory). Salient beliefs are assumed to be the antecedents, or causes, of their respective direct attitudes, norms, and PBC measures (Ajzen, 2002). As such, underlying, salient beliefs are particularly important when designing behavioral intervention programs based on the TPB. Moreover, indirect TPB variables may uncover influences that direct variables are unable to uncover.

A recent review of Sub-Saharan African studies (Protogerou et al., 2012) that have used the TPB to investigate sexual risk-taking in young people provided support for the applicability and suitability of the model in a variety of contexts. Consonant to studies from the West, the South African ones (Boer & Mashamba, 2005, 2007; Bosomptra, 2001; Bryan, Kagee, & Broaddus, 2006; Chitamun & Finchilescu, 2003; Giles, Liddell, & Bydawell, 2005; Heeren, Jemmott, Mandeya, & Tyler, 2007; Jemmott et al., 2007; Schaalma et al., 2009) found TPB variables to be significant predictors of intended and actual condom use in young people from urban, rural, and traditional (Zulu) settings, with  $R^2$  coefficients ranging between .14 and .67.

Criticisms of the TPB—and of the other sociocognitive models—have been centred around the emphasis the theory places on rational and premeditated aspects of human functioning, while downplaying other constructs (i.e., cultural, contextual, habitual) that have been found to influence risk-taking (Eaton, Flisher, & Aarø, 2003; Semple, Patterson, & Grant, 2002; Sutton, McVey, & Glanz, 1999; Triandis, 1994; Tschann, Adler, Millstein, Gurvey, & Ellen, 2002). It has also been argued that models based on premeditation are only moderately successful in predicting behaviors that require cooperation, such as condom use (Kashima, Gallois, & McCamish, 1993; Moore & Parker-Halford, 1999). Relevant to this, the intention–behavior gap phenomenon (i.e., behavior being inconsistent with intentions) is also seen as a weakness of the TPB. Indeed, it is often found that the TPB is successful in predicting intentions, but less so (or not at all) in predicting actual behavior (McEachan et al., 2011).

Such criticisms have been put forth by authors based in the West as being applicable to that setting. Yet, there has been a trend of reporting the same criticisms as particularly relevant to non-Western, especially African contexts. For example, some authors (e.g., Boer & Mashamba, 2007; Chitamun & Finchilescu, 2003; Schaalma et al., 2009) cite gender, and in particular, gender-based inequalities found in African contexts as significant predictors of sexual risk behaviors. Others (e.g., Airhihenbuwa & Obregon, 2000; Campbell & Murray, 2004) have argued against applying Western-based theories of social cognition to non-Western settings altogether, on the basis of alleged deep-rooted sociocultural differences

between the West and the South. As opposed to “Western” individualism and rationality, such arguments typically put forth the putative collective nature of non-Western, especially African cultures.

Adding to the existing South African literature, the current study used the TPB to identify correlates and predictors of condom use of undergraduate students at a university in the Western Cape of South Africa. In an effort to include variables that have been somewhat downplayed in the past but have nevertheless been linked to condom use, this study also took into consideration the influence of past behavior and context (i.e., relationship status, culture-relevant characteristics, age).

Past behavior has been found to exert a direct influence on subsequent behavior—including sexual risk-taking—and attempts have been made to include it in the TPB framework (e.g., Leone, Perugini & Ercolani, 1999; Lugoe & Rise, 1999; Norman, Conner, & Bell, 2000; Ouellette & Wood, 1998; Rhodes & Courneya, 2003). Investigators (e.g., Verplanken & Aarts, 1999; Yzer, Siero, & Buunk, 2001) have attributed past behavioral influences to habit formation, arguing that only first-time experiences, including those important to health, are acted out in a deliberate fashion. Thereafter, everyday activities are repeated and can become habitual. Thus, contrary to earlier data that viewed habits as completely nonvolitional (Fazio, 1986), more recent data have viewed habits as either nonvolitional or partly volitional (Sutton, 1994; Verplanken, Friborg, Wang, Trafimow, & Woolf, 2007). Still, other authors have failed to see the explanatory value of past behavior and have rejected its inclusion as a core variable in the TPB. For example, Ajzen (2002) argued that the effect of past behavior on intended and future behavior is, in essence, mediated by the variables of the TPB.

In terms of culture-relevant variables, studies conducted in South Africa have identified religiosity, socioeconomic status (SES), and gender as important influences on condom use. Religious involvement is extensive in South Africa and has been linked to young people's sexual behavior and attitudes (e.g., Eaton & Flisher, 2000; Simbayi et al., 2005). The international literature (e.g., Hollander, 2003; Nonnemaker, McNeely, & Blum, 2003; Shisana & Simbayi, 2002; Steinman & Zimmerman, 2004) has provided results suggesting that high religiosity decreases the likelihood of sexual risk-taking. Upon scrutiny, the results are not clear cut, as it has been found that religiosity may promote certain safer-sex behaviors, such as delaying first intercourse; oral sex and sexual touching; and abstinence (Burdette & Hill, 2009; Hardy & Raffaelli, 2003), but once sexual activity begins, religiosity tends to deter condom use (Aitken, 2005; Shornack, Ahmed, Studer, & Thornton, 1989; Zaleski & Schiaffino, 2000).

Negative correlations have been found between university students' contraceptive behaviors and religiosity (Cowden & Bradshaw, 2007; Pluhar, Frongillo, Stycos, & Dempster-McClain, 1998), with students reporting greater

religiosity as less likely to use effective contraceptive methods. Stemming from the work of Allport (1961; Allport & Ross, 1967), religiosity has often been conceptualized and approached in terms of its intrinsic and extrinsic dimensions. *Extrinsically oriented individuals* tend to “use” their religion to meet outside goals, such as security, solace, status, self-justification, meeting/socializing with people, and the like. By contrast, *intrinsically oriented individuals* see their religion as a master motive, shaping their everyday decisions and actions. Although studies linking religiosity to sexual behaviors are limited, findings have linked intrinsic religiosity to more conservative sexual attitudes and behaviors, and extrinsic religiosity to more liberal ones (e.g., Bassett et al., 2002; Reed & Meyers, 1991; Rowatt & Schmitt, 2003). In terms of SES, South African studies report poverty indexes, such as overcrowding, unemployment, lack of education, and limited access to medical information and social services as being associated with increased sexual risk-taking (Campbell & Mzaidume, 2002; Eaton & Flisher, 2000; Mathews et al., 2009).

Gender differences in HIV and condom use have been found in South African youth. Pettifor et al. (2004) have reported that in South Africa, nearly 1 in 4 women aged 20 to 24 is infected with HIV, as compared to 1 in 14 men of the same age. Women 20 to 24 years old are significantly less likely to report having used a condom at last sexual encounter and are even less likely to report *always* using a condom at last sexual encounter, as compared to their male counterparts. Studies (e.g., MacPhail & Campbell, 2001; Varga, 1997) have attributed higher rates of female HIV and non-condom use to gender inequalities and gender-based power differences. Also, Boer and Mashamba (2007) have demonstrated that in South Africa, variables of the TPB differentially predict intentions to use condoms for male and female undergraduates.

Our context-specific variables include relationship status and age. *Relationship status* (RS) refers to the type of sexual relationship in which one perceives oneself to be (i.e., exclusive, casual, or no relationship/single). Research has revealed that people in casual relationships tend to use more condoms, as compared to those in exclusive relationships (Bowleg, Lucas, & Tschann, 2004; Manlove, Ryan, & Franzetta, 2004, 2007). Relevant to this, epidemiological studies (e.g., Kyriakis et al., 2003; Kyriakis, Hadjivassiliou, Paparizos, Riga, & Katsambas, 2005; Miller & Green, 2002) have provided evidence linking RS to STI contraction, pointing out low partner change and low risk perception in heterosexual relationships as consistent antecedents of human papilloma virus (HPV) and chlamydia. Thus, contrary to popular belief, people who are in heterosexual relationships, who do not change partners frequently, and who perceive themselves to be safe are a high-risk group for common STIs. Regarding age, researchers have found that first-year university undergraduates use more condoms than do their older counterparts (e.g., Caldeira

et al., 2009; Siegel, Kline, & Roghmann, 1999). It has been suggested that first-year undergraduates still ascribe to high school and family values and norms, which typically endorse condom use. By contrast, older undergraduates tend to distance themselves from home and conform to university life, a situation that may not be supportive of consistent condom use.

Given the limited data and ongoing debate about the plausibility of models of social cognition in non-Western, especially Sub-Saharan African contexts, the main objective of the present study was to determine the applicability and suitability of the TPB in the study of condom use in South African university undergraduates. Based on our understanding of the literature, we hypothesized that the TPB would be successful in predicting intended and actual condom use, and that the results would be comparable to those obtained in the West. The secondary objective of the study was to examine the influence of past condom use and context (i.e., RS, religiosity, gender, SES, age) on condom use. We hypothesized that these context-relevant variables would contribute to the prediction of intended and actual condom use. We feel particularly justified in addressing context-specific and culture-specific variables, as the latest conceptualization of the TPB (Fishbein & Ajzen, 2010) argues for including such “background” variables, assuming there is evidence linking such variables to the behavior/population under investigation.

## Method

### Participants

The qualitative phase of the study (elicitation focus groups) comprised 22 students from all years of study who received course credit in exchange for their participation. The quantitative phase (prospective questionnaire survey) comprised convenience samples of 389 participants (74 males, 315 females). Attrition was low: At the Time 2 measurement, there were 349 participants. All participants were from a university in the Western Cape province of South Africa.

### Design and procedure

Ethics permission was granted by the university’s research ethics committees of the Faculty of Health Sciences and the Department of Psychology. The focus groups were conducted first, followed by the prospective questionnaire survey.

### Focus groups

We conducted five focus groups to elicit the information required to operationalize the indirect TPB measures, as exemplified by Ajzen (2002) and Francis et al. (2004). Eliciting underlying salient beliefs could provide potential sample-specific influences on condom use, in addition to

those obtained by the direct TPB variables, and the non-TPB variables of our study. Upon their arrival at the focus group site (i.e., a seminar room at the university), the participants were introduced to the study, reassured about the confidentiality of their responses, and signed informed consent sheets.

In each focus group, the participants were asked to take a few minutes and provide their thoughts in response to nine questions. To elicit underlying attitude beliefs, the following questions were asked: "What do you think are the advantages/disadvantages of using a condom every time you have sex in the following month?"; and "Is there anything else you associate with using a condom every time you have sex in the following month?" In terms of underlying normative beliefs, participants responded to the questions "Are there any individuals or groups who would approve/disapprove of your using a condom every time you have sex in the following month?"; and "Do any other people come to mind when you think about using a condom every time you have sex in the following month?" In terms of control beliefs, students were asked "What factors or circumstances would enable you/make it difficult or impossible for you to use a condom every time you have sex in the next month?"; and "Are there any other issues that come to mind when you think about the difficulty of using a condom every time you have sex in the next month?"

Focus groups lasted from 16 min (the shortest) to 45 min (the longest), and were digitally recorded and transcribed verbatim. At the end of focus group sessions, participants were handed debriefing sheets. Focus group responses were content-analyzed into themes (i.e., attitudinal beliefs, normative beliefs, control beliefs), which were then labeled. Beliefs were listed in order of response frequency (from the most frequently mentioned to the least frequently mentioned). The most frequently mentioned beliefs were selected and converted into a set of statements, which were expected to reflect the beliefs of the target population (about 75% of all mentioned beliefs were included to provide adequate coverage of the belief "population"). Content analysis was accomplished with the QSR NVivo 8 software.

### Questionnaire survey

At Time 1, predictors and correlates of condom use were measured, followed by Time 2 measurement (1-month follow-up) of actual condom use. To elaborate, at Time 1, students were approached in the context of a lecture, enabling direct supervision of respondents, with a brief description of the study and were assured (verbally and in writing) that their responses would be anonymous and confidential. Informed consent sheets were signed prior to data collection, and a group debrief took place immediately following questionnaire completion.

Each participant received two pre-numbered items clipped together: the main questionnaire that contained correlates and predictors of condom use, as well as a sealed envelope that contained the follow-up behavioral measure. Participants completed the Time 1 questionnaire, wrote their name on the sealed envelope, and returned both items to the researchers. The items were collected and stored separately. This procedure lasted about 25 min.

At Time 2, researchers returned the sealed envelopes to the students, by name. Each student had to open his or her envelope, complete the questionnaire and return it, and then discard the envelope. In this way, researchers managed to link Time 1 data to Time 2 data and still maintain participant anonymity. Questionnaire data were entered and analyzed using IBM SPSS Statistics 19 and Mplus.

### Measures

The questionnaire contained three sections. The first section contained behavioral and demographic measures (i.e., sexual activity, condom use frequency, age, gender, nationality, SES), the second contained RS and religiosity measures, while the third section measured the direct and indirect variables of the TPB.

#### Behavioral measure

Condom use frequency was defined/measured in terms of its target, action, context, and time (TACT) elements, while taking into consideration issues of specificity and generality (see Ajzen, 2002). The item "During the last month I used a condom" was scored on the verbal scale of *every time I had sex, most of the times I had sex, about half of the times I had sex, less than half of the times I had sex, or never*. The item "During the last month, I used a condom" was scored on a 7-point Likert-type scale ranging from 1 (*never*) to 7 (*always*). The option "I did not have sex last month" was also offered. The same behavioral measures were obtained at Time 1 and Time 2.

#### Demographics

Age was measured in years, gender in terms of male or female, and nationality was measured in terms of being *South African* or *other*. Finally, SES (*low* or *high*) was measured in terms of either receiving financial aid for university tuition fees or not.

#### Relationship status

RS was measured by the item "For the last month, I've been in . . ." Participants chose from the options of *an exclusive relationship, non-exclusive/casual relationship(s), or no relationship/single*.



## Religiosity

Internal versus external religiosity was measured with Gorsuch and McPherson's (1989) Intrinsic/Extrinsic Revised (I/E-R) single-item scale, which is based on Gorsuch and Venable's (1983) earlier Religiosity Age–Universal I-E scale. The I/E-R has been found to consistently differentiate between the two religiosity dimensions (see Gorsuch & McPherson, 1989). Intrinsic religiosity was measured by the item “My whole approach to life is based on my religion,” while extrinsic religiosity was measured by the item “I go to church, or other places of worship, mainly because I enjoy seeing people I know there.” Both items were scored on a 7-point scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

## TPB measures

Direct TPB measures and Cronbach's alpha reliability coefficients are presented in Table 1, while indirect TPB measures are presented in Table 2. All TPB items were all scored on 7-point scales. Unipolar scoring was favored for the indirect items (instead of the bipolar –3 to +3), as we concur with arguments (e.g., Chitamun & Finchilescu, 2003; Pagel &

Davidson, 1984) that view belief components as measures of subjective probabilities and, as such, are more precisely scored in a unipolar fashion.

## Definitions

Three definitions were provided on the first page of the questionnaire, aiming to aid participants' understanding of concepts and terminology used therein. *Sex* was defined as “engaging in any form of oral or/and vaginal or/and anal sex.” *Condom use/safe-sex* was defined as “using a condom every time you have sex (i.e., vaginal, oral, and anal sex). Other methods of safe sex are not emphasized in this study.” An *exclusive relationship* was defined as “an emotional (especially sexual) association involving only two people.” Additionally, participants were given clarifications, in written and verbal form, explaining that although *safe sex* may be understood in several ways, this particular study equated safe sex with consistent condom use.

## Data analysis

In addition to descriptive statistics (i.e., means, standard deviations, and percentages) and correlational analyses, a series of multi-group structural equation models were tested with Mplus to predict intentions to use condoms. Two groups were defined: (a) those who were not sexually active between the first and the second data collections; and (b) those who were sexually active. We assumed that the use-of-condoms issue would be more salient among those who are sexually active, resulting in differences in patterns and strengths of associations. In addition to the TPB predictors (i.e., attitudes, subjective norms, PBC), the importance of gender, age, SES (i.e., receiving vs. not receiving financial aid), religiosity (i.e., intrinsic vs. extrinsic), and relationship status (i.e., in a relationship or not) were examined.

A second structural equation model (single group) was developed to examine the prediction of reported condom use between the two data collections. Because of the limited number of observations ( $n = 82$ ), only the TPB predictors were included in the analysis. This included previous condom use.

Simple, additive mean scores (sum of all scores divided by number of items) were constructed for intentions (three items), attitudes (five items), and PBC (four items). All other variables to be entered into the models were measured with single items.

In all testing of models, a maximum likelihood estimator with robust standard errors (MLR) was used. This estimator is robust to non-normality of observations. Indirect paths, from attitudes or subjective norms via intentions to subsequent condom use, were tested with Sobel's test. The overall fit of the models was tested with the Yuan–Bentler  $T^2_*$  test statistic. Comparative fit index (CFI) and root mean square

**Table 1** Direct Variables of the Theory of Planned Behavior (TPB) and Reliability Coefficients

Variable	Item	$\alpha$
Intention	I intend to use a condom every time I have sex in the next month.	.95
	I plan to use a condom every time I have sex in the next month.	
	I will try to use a condom every time I have sex in the next month.	
Attitude	For me, using a condom every time I have sex in the next month is . . .	.83
	<i>enjoyable–unpleasant</i>	
	<i>pleasant–unpleasant</i>	
	<i>good–bad</i>	
	<i>foolish–wise</i>	
Subjective norms	The people whose opinions I value would <i>approve–disapprove</i> of my using a condom every time I have sex in the next month.	—
PBC	The decision to use condoms every time I have sex in the next month is under my control.	.84
	For me, using a condom every time I have sex in the next month is possible.	
	I am confident that if I wanted to, I could use a condom every time I have sex in the next month.	
	It is easy for me to use a condom every time I have sex in the next month.	

Note. PBC = perceived behavioral control. Intention items were rated on a scale ranging from *likely* to *unlikely*. PBC items were rated on a scale ranging from *agree* to *disagree*.

**Table 2** Indirect Theory of Planned Behavior Measures, as Retrieved From Elicitation Procedures

Measure	Item
Attitudinal beliefs: behavioral belief strength <sup>a</sup>	<p>If I use a condom every time I have sex in the next month, I will be protected from sexually transmitted infections.</p> <p>If I use a condom every time I have sex in the next month, I will be protected from unwanted pregnancies.</p> <p>Using a condom every time I have sex in the next month can distance me from my sexual partner physically.</p> <p>Using a condom every time I have sex in the next month can distance me from my sexual partner emotionally.</p> <p>Using a condom every time I have sex in the next month can compromise bodily pleasure (sensation).</p>
Outcome evaluation <sup>b</sup>	<p>Protecting myself from sexually transmitted infections</p> <p>Avoiding pregnancy</p> <p>Distancing myself from my partner physically/emotionally</p> <p>Compromising my bodily pleasure (sensation)</p>
Normative beliefs: normative belief strength <sup>a</sup>	<p>My parents (or parental figures) think I should use a condom every time I have sex in the next month.</p> <p>My close friends think I should use a condom every time I have sex in the next month.</p> <p>My main sexual partner thinks we should use a condom every time we have sex in the next month.</p> <p>My religion would approve of my using a condom every time I have sex in the next month.</p>
Motivation to comply <sup>c</sup>	<p>When it comes to using condoms, what my parents (or parental figures) think I should do matters to me.</p> <p>When it comes to using condoms, what my close friends think I should do matters to me.</p> <p>When it comes to using condoms, what my religion thinks I should do matters to me.</p> <p>When it comes to using condoms, what my main sexual partner thinks I should do matters to me.</p>
Control beliefs	<p>I expect that my main sexual partner will object to us using a condom every time we have sex in the next month.<sup>c</sup></p> <p>Condoms will be easily accessible to me, should I decide to have sex in the following month.<sup>a</sup></p> <p>Using a condom every time I have sex in the following month is expensive for me.<sup>c</sup></p>
Control belief power <sup>c</sup>	<p>If my main sexual partner objects to it, it will be difficult for me to use a condom every time I have sex in the next month.</p> <p>If I don't have easy access to condoms, it will be less likely for me to use them every time I have sex in the next month.</p> <p>The cost of condoms could make it difficult for me to use them every time I have sex in the next month.</p>

<sup>a</sup>Measured on a scale ranging from *likely* to *unlikely*. <sup>b</sup>Measured on a scale ranging from *desirable* to *undesirable*. <sup>c</sup>Measured on a scale ranging from *agree* to *disagree*.

error of approximation (RMSEA) were reported to assess the fit of the models. According to Hu and Bentler (1999), the cutoff values indicating a good fit are .95 or more for CFI, and .06 or less for RMSEA.

## Results

### Descriptive data

Table 3 shows the descriptive statistics (percentages, means, and standard deviations) for all participants and for sexually active participants on relevant study variables. The mean age of the participants was 19.1 years ( $SD = 1.8$ ; range = 17–30 years). Of the participants, 34.4% were receiving financial aid. In addition, 21.1% of participants were sexually active, and 44.5% were in a relationship.

### Correlates of condom use

Table 4 displays the correlations among the study variables for all study participants. Table 5 presents the correlations for sexually active participants.

### Associations for the whole sample

The core TPB variables were all statistically significant correlates of intentions to use condoms, with attitudes being the strongest ( $r = .55$ ,  $p < .001$ ), followed by PBC ( $r = .40$ ,  $p < .001$ ), and subjective norms ( $r = .30$ ,  $p < .001$ ). Some statistically significant associations were also obtained between the indirect TPB variables and condom use intentions (not shown in Table 4), potentially clarifying underlying cognitive influences. All attitudinal beliefs were significantly linked to intentions to use condoms, with “protection from STIs” being

**Table 3** Descriptives for All Participants and Sexually Active Participants

Variable	# of items	Range	All participants		Sexually active participants		<i>n</i>	%
			<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Condom use reported at Time 1	1	0–4	—	—	1.50	1.74		
Condom use reported at Time 2	1	0–4	—	—	2.71	1.61		
Intentions	3	0–6	4.50	1.70	4.57	2.01		
Attitudes	5	0–6	3.88	0.99	4.19	1.12		
Subjective norms	1	0–6	5.26	1.30	5.57	0.77		
Perceived behavioral control	4	0–6	5.12	1.04	5.43	0.81		
Intrinsic religiosity	1	0–6	3.89	2.05	—	—		
Extrinsic religiosity	1	0–6	1.73	1.56	—	—		
Age (in years)	—	17–30	19.1	1.8	—	—		
Gender								
Male							74	19.0
Female							315	81.0
Receiving financial aid?								
No							255	65.6
Yes							134	34.4
Relationship status								
In a relationship							173	44.5
Single							216	55.5

Note. All participants, *N* = 389. Sexually active participants, *n* = 82.

**Table 4** Correlations Among Study Variables: All Participants

Variable	1	2	3	4	5	6	7	8	9
1. Intentions	—								
2. Attitudes	.51***	—							
3. Subjective norms	.30***	.29***	—						
4. Perceived behavioral control	.40***	.37***	.58***	—					
5. Gender <sup>a</sup>	-.07	-.02	.02	-.01	—				
6. Receiving financial aid? <sup>b</sup>	.05	.00	-.10	-.03	-.01	—			
7. Intrinsic religiosity	-.01	-.18***	-.15**	-.15**	-.04	.19***	—		
8. Extrinsic religiosity	-.02	.06	.07	.07	.06	.02	.02	—	
9. Relationship status <sup>c</sup>	.04	-.08	-.11*	-.07	-.07	.00	.19***	.13*	—
10. Age (truncated)	-.06	.16*	.08	.04	.10	-.10	-.30	.09	-.17**

Note. *N* = 349.

<sup>a</sup>0 = male; 1 = female. <sup>b</sup>0 = no; 1 = yes. <sup>c</sup>0 = in a relationship; 1 = single.

\**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

strongest ( $r = .25, p < .01$ ), followed by “protection from pregnancy” ( $r = .20, p < .01$ ). The beliefs that condom use distances sexual partners physically ( $r = -.18, p < .01$ ) and emotionally ( $r = -.16, p < .01$ ), while compromising bodily pleasure ( $r = -.18, p < .01$ ) were also significant correlates of condom use intentions. Similarly, all normative beliefs correlated significantly with condom use intentions. Main sexual partner influence was the strongest correlate ( $r = .53, p < .01$ ), followed by close friends’ influence ( $r = .40, p < .01$ ), parents’ influence ( $r = .32, p < .01$ ), and religion’s influence ( $r = .23, p < .01$ ). In terms of the non-TPB variables, statistically significant associations were obtained between intrinsic religiosity and attitudes ( $r = -.18, p < .001$ ), and between age and attitudes ( $r = .16, p < .05$ ).

### Associations for the sexually active sample

Core TPB variables were statistically significant correlates of intended and subsequent condom use. Here, attitudes were the strongest correlates of condom use intentions ( $r = .56, p < .001$ ), followed by subjective norms ( $r = .50, p < .001$ ) and PBC ( $r = .25, p < .05$ ). The strongest correlates of subsequent (Time 2) condom use were intentions ( $r = .69, p < .001$ ), followed by PBC ( $r = .50, p < .001$ ), attitudes ( $r = .36, p < .001$ ), and subjective norms ( $r = .34, p < .01$ ). Three indirect TPB variables proved to be significant correlates of subsequent condom use (not shown in Table 4). In particular, the attitudinal belief that condoms protect from STIs ( $r = .22, p < .05$ ), as well as the influence of main sexual partner ( $r = .57$ ,

**Table 5** Correlations Among Study Variables: Sexually Active Participants

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Condom use reported at T1	—										
2. Condom use reported at T2	.27*	—									
3. Intentions	.36***	.69***	—								
4. Attitudes	.48***	.36***	.56***	—							
5. Subjective norms	.11	.34**	.50***	.37***	—						
6. Perceived behavioral control	.25*	.50***	.31**	.31**	.37***	—					
7. Gender <sup>a</sup>	-.02	-.08	-.18	-.07	.00	.07	—				
8. Receiving financial aid? <sup>b</sup>	-.20	.21	.11	-.05	.10	.03	-.00	—			
9. Intrinsic religiosity	-.13	.31**	.15	.15	.15	.05	-.26*	.33**	—		
10. Extrinsic religiosity	.23	.07	.09	.25*	.00	.09	-.16	.040	.04	—	
11. Relationship status <sup>c</sup>	-.25*	.34**	.28*	.07	.08	.16	-.09	.15	.06	.14	—
12. Age (truncated)	.26*	-.28*	-.12	.16	-.14	-.26*	.02	-.24*	-.39*	.22*	-.23*

Note.  $n = 82$ . T1 = Time 1; T2 = Time 2.

<sup>a</sup>0 = male; 1 = female. <sup>b</sup>0 = no; 1 = yes. <sup>c</sup>0 = in a relationship; 1 = single.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

$p < .01$ ) and religiosity ( $r = .32, p < .01$ ) were linked to subsequent condom use.

In terms of the non-TPB variables, statistically significant correlations were obtained between intrinsic religiosity and subsequent condom use ( $r = .31, p < .01$ ), relationship status, and intended and subsequent condom use ( $r = .28, p < .05$ ; and  $r = .34, p < .01$  respectively), and age and subsequent condom use ( $r = -.28, p < .05$ ).

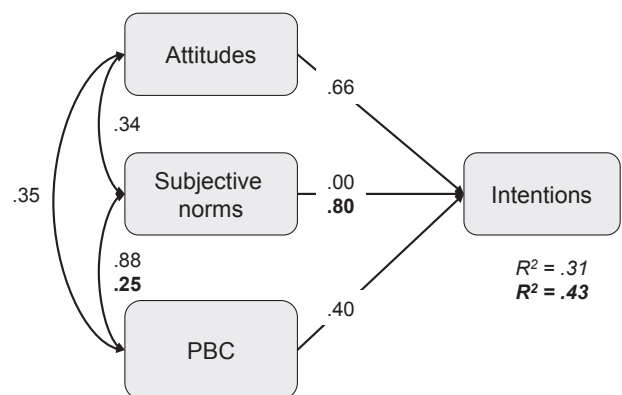
### Differences in condom use behavior as a function of relationship status

We conducted an independent-sample  $t$  test to compare subsequent condom use reports for single participants and those being in a relationship (all sexually active). There was a borderline significant difference between those being in a relationship ( $M = 2.70, SD = 1.70$ ) and those being single ( $M = 3.76, SD = 0.44$ ),  $t(25) = -2.47, p = .08$  (two-tailed). With a larger sample, the difference might have turned out to be statistically significant. In fact, the magnitude of the differences in the means ( $M$  difference = 1.06; 95% confidence interval [CI] =  $-1.95$  to  $-0.18$ ) was large ( $\eta^2 = .197$ ), implying that 19.7% of the variance in condom use was explained by relationship status.

### Predictors of condom use: structural equation modeling

Figure 1 shows intentions by attitudes, subjective norms, and PBC from a multi-group analysis with two groups: sexually inactive versus sexually active between Time 1 and Time 2. The model fit the data well,  $\chi^2(4) = 2.06, p = .72$  (CFI = 1.00; RMSEA = 0.00).

More variance was explained among the sexually active participants (42.7%) than among the sexually inactive ones (31.1%). There were two differences in the data between the



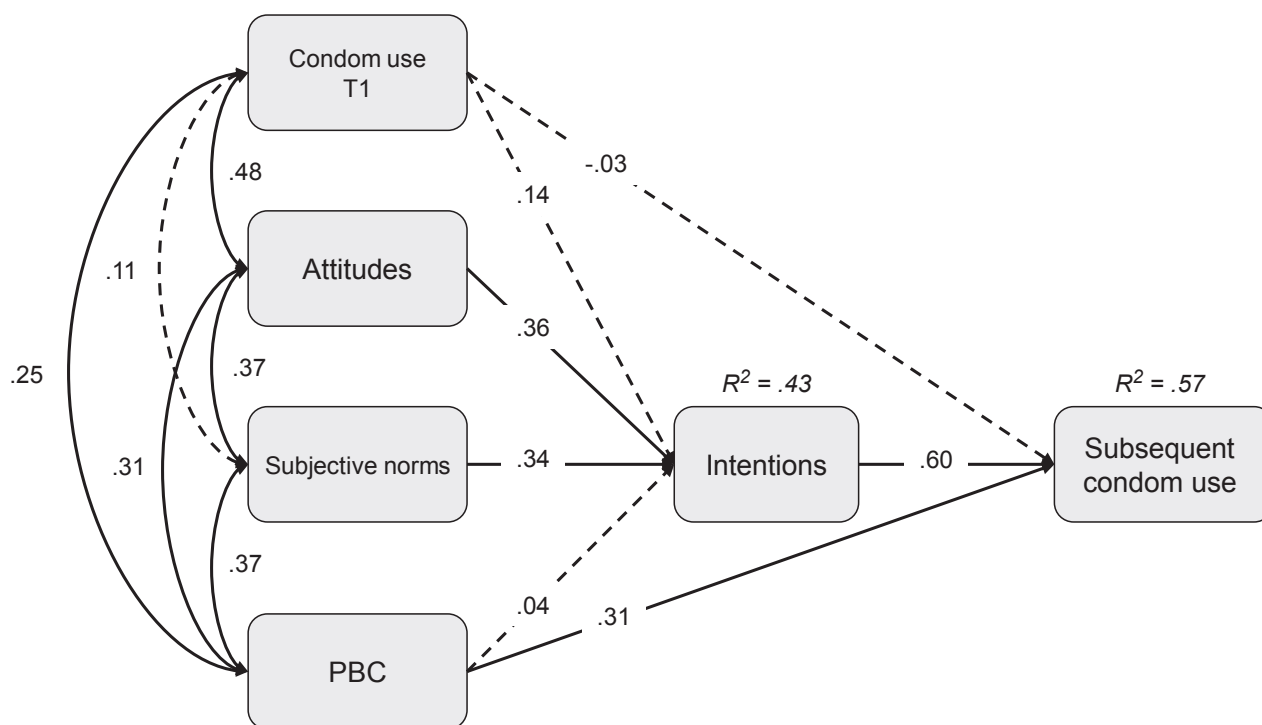
**Figure 1** Intentions by attitudes, subjective norms, and perceived behavioral control (multigroup analysis;  $ns = 267$  and  $82$ ). Estimator: MLR and unstandardized coefficients. Coefficients for sexually active (if different) appear in boldface.

sexually active and sexually inactive participants. The correlation between subjective norms and PBC was higher among the inactive participants, while the regression coefficient for subjective norms was only significant among the sexually active participants.

Inspection of standardized coefficients for the sexually active and sexually inactive participants separately (not shown in Figure 1) revealed that the associations among the predictors were mostly only moderately strong (.26 to .39). The correlation between subjective norms and PBC among the sexually inactive was the highest (.59), but not sufficiently high to threaten the stability of the regression coefficients of the model.

The unstandardized regression coefficients were set to be equal across the two groups for attitudes and PBC, but allowed to be different for subjective norms. The





**Figure 2** Subsequent condom use by intentions and both variables by previous condom use, attitudes, subjective norms, and perceived behavioral control among sexually active participants after first data collection ( $n = 82$ ). Estimator MLR and  $yx$  standardized coefficients. Dotted lines indicate nonsignificant ( $p > .05$ ) associations. T1 = Time 1.

standardized regression coefficients were .40 and .37 for attitudes, .00 and .30 for subjective norms, and .28 and .16 for PBC (for sexually active and sexually inactive participants, respectively).

A number of other variables were tested as predictors in the model, one by one: gender, age, SES, religiosity, and relationship status. Only age was a statistically significant predictor of intentions, after controlling for the predictors already included in the model. However, the association was low ( $-.10$  in both groups), and led to no noticeable changes in the other associations in the model.

Figure 2 shows subsequent condom use by intentions and both variables by previous condom use, attitudes, subjective norms, and PBC among sexually active after first data. The model fit the data well,  $\chi^2(2) = 2.62$ ,  $p = .27$  (CFI = .993; RMSEA = .061). Intercorrelations among predictors were from low to moderately high (.11 to .48). All regression coefficients shown were standardized ( $yx$  standardization). Intentions were the strongest predictor of subsequent condom use (.60), but PBC was also a significant predictor (.31). The model explained 56.7% of the variance in condom use.

Attitudes (.36) and subjective norms (.34) were both significant predictors of intentions. The variance in intentions

explained amounted to 43.2%. The indirect path from attitudes through intentions to subsequent condom use and the corresponding path from subjective norms were both significant ( $p < .001$ ) and equally strong (both coefficients = .21). PBC was directly linked to condom use (.31), without being mediated by intentions.

## Discussion

### Predictive power of the TPB

The results of this study clearly support the applicability of the TPB in the study of condom use in South African university undergraduates. The model was able to explain 43.2% of the variance of intentions to use condoms among the sexually active sample, and 31.1% of the variance among the sexually inactive. In terms of actual condom use among the sexually active participants, the impact of the TPB was even more impressive, as it accounted for 56.7% of the variance. All core TPB variables predicted condom use intentions, with attitudes being the strongest predictors. Notably, even though subjective norms predicted condom use intentions for the sexually active participants, the variable failed to do so for the sexually inactive.

It is possible that our sexually inactive students were influenced by personal subjective attitudes and estimations of control—and not by significant others—given their inexperience in condom negotiation and use. Relevant to this, attitudes were the strongest correlates of condom use intentions for all participants, followed by PBC and subjective norms. Our data compare favorably with findings of Western meta-analyses (e.g., McEachan et al., 2011), which have demonstrated that TPB constructs can predict up to 43.3% of the variance in health behavior intentions, including condom use. Furthermore, our data are in line with South African studies that used the TPB to investigate condom use intentions (e.g., Boer & Mashamba, 2005, 2007; Bryan et al., 2006; Giles et al., 2005; Heeren et al., 2007; Jemmott et al., 2007; Schaalma et al., 2009), and obtained  $R^2$  coefficients ranging between .14 and .67. The finding that attitudes were the strongest correlates and predictors of condom use intentions for all participants contradicts arguments (e.g., Airhihenbuwa & Obregon, 2000) viewing African decision making as predominantly based on communality and collaboration (i.e., social norms). We argue that, consonant to the international literature, the contribution of the TPB variables will vary depending on the nature of the sample under investigation, and not the overall “culture.”

The prospective component of our study enabled inspection of the factors involved in predicting actual condom use among the sexually active participants, a month after initial measurement. In this respect, too, the TPB performed very well, explaining 56.7% of the variance in condom use behavior. As expected by the theory, both attitudes and subjective norms significantly predicted subsequent condom use, via intentions. PBC predicted subsequent condom use directly, without being mediated by intentions. Additionally, all the core TPB variables were significantly correlated with subsequent condom use, providing additional support for the theory's success in explaining condom use behavior in this context.

The indirect variables of the TPB elucidated underlying cognitive influences on condom use for our sample. Upon combining the information obtained from sexually active and inactive students, we put forth the belief that condoms protect from STIs, as well as the normative influence of main sexual partner and religion, as prominent correlates of intended and actual condom use. Student references to the importance of religion in shaping romantic and sexual behaviors, including those pertaining to condom use and other contraceptive practices, were very common. While participants were confident that their religion (regardless of denomination) required abstinence, they reported considerable confusion over their religion's approval or disapproval of contraception once sexually active. Furthermore, the religious requirement of abstinence seemed to explain, at least in part, the low rates of sexual activity in our sample.

## Contribution of variables pertaining to culture, context, and past behavior

Intrinsic religiosity was significantly correlated with condom use attitudes, subjective norms, and PBC for the whole sample. All associations were negative, implying that those high in intrinsic religiosity may hold less favorable attitudes toward condom use; be less confident in their ability to use condoms or find condom use beyond their control; and think that significant others would disapprove of their using condoms. Our findings, therefore, are in line with studies that have found university students' high religiosity to be inversely linked to contraceptive attitudes and behaviors (Cowden & Bradshaw, 2007; Pluhar et al., 1998). For the sexually active students, intrinsic religiosity was positively correlated with subsequent condom use, potentially implying that the sexually experienced are able to compromise religious beliefs with sexual and safer-sex practices.

Relationship status proved to be a statistically significant correlate of intended and actual condom use among the sexually active participants. Moreover, subsequent condom use varied as a function of relationship status (although this finding was borderline significant). Consonant to previous findings (e.g., Manlove et al., 2007; Protogerou & Turner-Cobb, 2011), students in relationships were less likely to use condoms than were their single counterparts, suggesting condom use as a potential threat to emotional and physical closeness. Gender and SES were not significant correlates or predictors of condom use. Contrary to findings putting a premium on the influence of gender and SES on unsafe sex in South African contexts (e.g., Eaton et al., 2003), this study did not obtain evidence of such influences.

Past behavior (Time 1 measurement) was significantly correlated with subsequent behavior among the sexually active participants, but it did not demonstrate any predictive properties when it was tested in the second structural equation analysis. Therefore, we have not provided enough support for the consideration of past behavior in sexual risk-taking, alongside theoretical models of social cognition (e.g., TPB).

After controlling for the TPB variables, only age proved to be a statistically significant (albeit weak) predictor of condom use intentions. Age was also inversely related to subsequent condom use among the sexually active participants. Consonant to our initial expectations and prior findings (e.g., Caldeira et al., 2009; Siegel et al., 1999), younger students had stronger intentions to use condoms, as compared to their older counterparts. It may be that first-year undergraduates still ascribe to high school and family values and norms, which typically endorse condom use.

## Study limitations

The small number of males may have obscured the existence of gender differences. Similarly, with the small number of

sexually active participants ( $n = 82$ ), we may have not been able to obtain differences between sexually active and inactive participants. In terms of the SEM analysis, the small number of sexually active participants enabled us to test for the TPB variables only; it is thus possible that associations with other variables of interest might exist, but remain uncovered.

Our primary objective was accomplished; that is, demonstrating the applicability and suitability of the TPB to study condom use in non-Western, particularly South African university undergraduates. Apart from the (weak) impact of age, none of the remaining non-TPB variables proved to be significant predictors of condom use once the TPB variables were taken into account. As the inclusion of additional variables (i.e., in the multigroup equation models) did not improve the prediction of condom use, we may also argue in favor of the sufficiency of the TPB (for an explication of the model's sufficiency assumption, see Fishbein & Ajzen, 2010). Indeed, we demonstrated that the non-TPB variables failed to threaten the stability of the regression coefficients of the TPB model. Our results allow us to disagree with contentions viewing the TPB, as well as other sociocognitive theoretical models, as being incompatible with non-Western contexts. Consonant to similar studies in the West, the TPB variables of this study predicted South African undergraduates' intentions to use condoms—and subsequent condom use among sexually active students—by yielding  $R^2$  coefficients as large as .43 and .57, respectively.

Of interest are the obtained correlations between internal religiosity and condom use attitudes, as well as age and condom use intentions. It seems that older students in our sample had weaker intentions to use condoms. Also, those who viewed religion as their “master motive” held less favorable attitudes toward condom use, felt they had less control over condom use, and perceived their significant others as

disapproving of condom use. Still, this attitude seems to change for sexually active participants, who appear to have reconciled internal religiosity and condom use. Moreover, our findings point to the importance of taking relationship status into consideration when investigating condom use. Relationship status explained 20.0% of the variance in actual condom use in sexually active students, with single ones reporting using more condoms.

We believe that our results can have implications for condom-promoting interventions. In particular, we would argue that interventions be tailor-made to participants as a function of their age or year of study. We see the core TPB variables as crucial in forming condom use intentions, with underlying normative beliefs (i.e., “My main partner/religion thinks we should use a condom every time we have sex”), attitudinal beliefs (i.e., “Condoms protect against pregnancy/STIs”; “Condoms distance sexual partners psychophysically”) as particularly salient. Our elicitation focus groups uncovered the prominence of religion and religious beliefs in shaping sexual and contraceptive behaviors. We find particularly relevant to intervention participants' confusion as to whether religion allows for the use of contraception, once one is sexually active.

One aspect of intervention efforts could be to find ways to challenge attitudinal and normative beliefs that resist safer sex, with the main purpose of forming strong intentions to use condoms. Only 23.5% of the participants of the present study were sexually active, implying that this young adult population is a good candidate for condom use promotion efforts. Condom use promotion is more effective when it targets non-sexually active populations, or populations that have not engaged in a great deal of sexual activity. It is unlikely that our participants have established strong habits relating to (un)safe sex, suggesting a window of opportunity for orienting them toward condom use.

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