

**Developing an Integrated Theoretical Model of Young Peoples' Condom Use in Sub-Saharan Africa**

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### **Abstract**

**Objective.** We aimed to develop an integrated theoretical model of the determinants of condom use in young people from sub-Saharan African (SSA) nations. Model development was informed by research predicting condom use in SSA nations adopting individual-level social-cognitive and socio-ecological theories, and guided by McMillan and Conner's (2007) framework of social-cognitive predictors of health.

**Method.** We conducted a scoping review of research on social-cognitive and socio-ecological predictors of condom use in young people in SSA. The integrated model was developed based on the constructs from the review and guided by McMillan and Conner's framework to classify the constructs and isolate the processes by which the constructs impact condom use.

**Results.** Included studies (N=45) utilised constructs from seven individual-level social cognitive theories and included multiple socio-ecological variables as predictors of condom use. The integrated model included dispositions to act as a proximal determinant of condom use which mediated the effect of four categories of social cognitive constructs on condom use: attitudes, control perceptions, norms, and self-representations. Socio-ecological factors were classified into four categories: relational, individual differences, societal/structural, and community and peer influences. Each had direct and indirect effects on condom use in the model, reflecting the non-conscious and conscious pathways to action, respectively.

**Conclusion.** We expect our integrated model to provide an evidence- and theory-based guide to future research examining the antecedents of condom use in young people in SSA. We also anticipate it will assist in developing targets for interventions that will be effective promoting condom use in this population.

*Key words:* HIV prevention, social-cognitive theories, theory of planned behaviour, socio-ecological model, Sub-Saharan Africa, theoretical integration.

## **Developing an Integrated Theoretical Model of Young Peoples' Condom Use in Sub-Saharan Africa**

Nations in Sub-Saharan Africa (SSA) carry the substantive burden of the HIV pandemic with 71% new HIV infections occurring in this population, and 80% of the global population living with HIV reside in these countries (UNAIDS, 2015; UNAIDS/ WHO, 2013). The risk of HIV infection is significantly increased by having unprotected sex and condom use has been identified as a key behaviour in prevention of infection from HIV. Studies conducted in SSA have shown that young people living in the region engage in inconsistent or low condom use (Eggers, Aarø, Bos, Mathews, & de Vries, 2014; Kalolo & Kibusi, 2015; Protogerou, Flisher, Wild, & Aarø, 2013). Consequently, HIV prevention is a priority issue for public health and infection control in SSA nations.

Various behavioural interventions promoting safer-sex and condom use have been implemented targeting young people in SSA (see Wamoyi et al., 2014 for a review of interventions). Reviews of the efficacy of [such interventions](#) reveal favourable knowledge and attitude change, but limited or no change in actual safer-sex behaviour (Eaton, Flisher, & Aarø, 2003; Exavery et al., 2011; Protogerou & Johnson, 2014; Scott-Sheldon, Walstrom, Harrison, Kalichman, & Carey, 2013). This has led to calls for more systematic research at the formative stage to identify the key antecedents of condom use among young people in SSA. Such work needs to draw from psychological, behavioural, and socio-ecological theory to derive the key multiple interpersonal and environmental factors likely to impact on condom in this population. The identification of such factors, the strength of their effects on behaviour, and the processes by which the factors affect condom use is likely to be invaluable formative research contributing to the development of effective behavioural interventions in this context.

Determinants of condom can be grouped into (a) individual factors, such as personal beliefs, attitudes and motivations affecting behavioural decisions, (b) interpersonal factors, such as emotional, normative, and cognitive processes that occur within the immediate social context where sexual-risk behaviour occurs, and (c) socio-ecological factors, such as the wider economic, societal, and political conditions that facilitate or impede sexual risk behaviours within more immediate social spaces research (e.g., Albarracin, Tannenbaum, Glasman, & Rothman, 2010). Much of the research examining the determinants of condom use has focused on individual factors derived from models of social cognition (e.g., Ajzen, 1991), also known as individual-level theories (ILTs), and, to a lesser extent, on factors derived from social-ecological models (e.g., Bronfenbrenner, 1977). ILTs postulate that health behaviour is primarily a function of beliefs and subjective evaluations. Key beliefs and evaluations identified in ILTs include perceived severity of a health risk and perceived vulnerability to a health risk, perceived likelihood that adopting a health behaviour will protect against the health risk, perceptions of control over engaging a health behaviour, confidence in changing a health behaviour, estimation of costs and benefits associated with a health behaviour, perceived emotional and social consequences of health behaviours, and perceptions about social norms (for a detailed description of these theories and their application to sexual health, see Marks, Murray, Evans, & Estacio, 2015). Many ILTs conceptualize these belief-based factors as antecedents of health behaviour, and propose that the mechanism by which they relate to behaviour is through changes in motivation. As a consequence, individuals intentions to engage in the health behaviour, a motivational construct reflecting the degree of planning and effort an individual is prepared to invest in pursuing the behaviour, will mediate the effects of the beliefs on behaviour (Ajzen, 1991, 2015; Fishbein & Ajzen, 2009; Perugini & Conner, 2004; Triandis, 1977; Rogers, 1983). Of course, some constructs may affect behaviour directly, independent of intentions. Such

factors likely reflect the traits, dispositions, or belief-based factors which likely reflect non-intentional pathways to behaviour that affect action beyond individuals' awareness (Hagger et al., 2006). Another category of theories is those that focus on environmental determinants of health behaviour. Socio-ecological models postulate that health behaviour is shaped by interactions between individuals and their multiple social environments and contexts (Bronfenbrenner, 1977; Stokols, 1996). Key socio-ecological determinants of health behaviours derived from the socio-ecological approach include family influences, relationship and peer influences, community, and wider societal or structural influences (DiClemente et al., 2005; Protogerou, Flisher, & Wild, 2014).

To date, ILTs have shown considerable promise in predicting and explaining variance in condom use, and in informing the development of safer-sex interventions (Harrison, Newell, Imrie, & Hoddinott, 2010). More recently, however, investigators have advocated the need to integrate ILTs in the context of health and risk behaviour (e.g., Eggers et al., 2014; Hagger & Chatzisarantis, 2009, 2014; Montano, Kasprzyk, Glanz, Rimer, & Viswanath, 2008). Primary reasons behind the development of integrated behaviour models include weaknesses or limitations associated with using single ILTs, especially the conceptual overlap between theoretical constructs, the intention-behaviour gap, individualistic bias, emphasis on rational decision making, and problems with falsifiability. Integrated models can address weaknesses of ILTs, **reduce conceptual redundancy and overlap** and offer **comprehensive**, well-rounded, yet parsimonious, explanations of health and risk behaviours (Hagger & Chatzisarantis, 2009; 2014; 2015).

The conceptual overlap in ILT constructs, and the need to move such theories forward as comprehensive explanations of behaviour, has catalysed the development of summary models, or classification systems **of ILT constructs** (Biddle, Hagger, Chatzisarantis, & Lippke, 2007). These systems categorize and synthesize the overarching core theoretical

antecedents of health behaviour, particularly through identifying variations and commonalities among theory constructs, thereby minimising conceptual overlaps and distilling theories down to a set of distinct, core constructs (e.g., Fishbein, Triandis, Kanfer, Becker, & Middlestadt, 2001; Kasprzyk, Montaño, & Fishbein, 1998). Of the existing classification systems, McMillan and Conner's (2007) 'core health cognitions', offers a comprehensive, yet parsimonious, summary and synthesis of ILT constructs that encompasses many of those that have featured prominently in the prediction of condom use in SSA nations. According to this system, ILT prominent constructs are summarized conceptually under five overarching core health cognitions, all of which are expected to explain or predict health behaviour. These core health cognitions include attitudes (e.g., affective and evaluative attitudes), self-representations (e.g., self-esteem and self-identity), norms (e.g., injunctive and descriptive norms), control perceptions (e.g., self-efficacy beliefs and confidence in overcoming barriers), and dispositions to act (e.g., intentions and motives). The system can be used as a generic framework to conceptualize and study antecedents of health and risk behaviour.

Previous reviews, including those focusing on the SSA region, have identified the psychological antecedents of condom use from single ILTs (e.g., Albarracin, Johnson, Fishbein, & Muellerleile, 2001; Protogerou, Flisher, Aarø, & Mathews, 2012; Sheeran, Abraham, & Orbell, 1999). While such reviews have provided some cumulative evidence on the psychological antecedents of condom use from those particular theoretical perspectives, they have tended to be confined to one particular approach, and **consequently** suffer from the limitations and boundary conditions of the particular theory. There is therefore a need to synthesise evidence from multiple ILTs that have been used to explain condom use. An integrated model based on the synthesis of theories, and accompanying data that have tested the efficacy of the psychological factors derived from these theories in predicting behaviour,

will make an original contribution to knowledge by identifying the factors most strongly related to condom use, and likely to be most viable as targets of effective interventions to promote condom use.

The purpose of the present conceptual review is to categorize the theoretical antecedents of young peoples' condom use in SSA, identify the processes by which these factors relate to condom use, and develop a comprehensive integrated model of condom for young people in SSA nations. Specifically, we aim to (a) identify the ILTs applied to condom use in SSA young people, the emergent social-cognitive factors related to condom use, and associated processes by which the factors affect behaviour; (b) identify the key socio-ecological antecedents of condom use in this population; (c) synthesize the antecedents derived from the extant evidence in an integrated theoretical model; and (d) highlight how the new integrated model serves to inform future research and practice on condom use in this population.

## **Method**

### **Scoping Review**

We conducted a scoping literature synthesis of theory-based condom use antecedents in young people from SSA, following the guidelines of Arksey and O'Malley (2005). The purpose of a scoping review is to "map rapidly the key concepts underpinning a research area and the main sources and types of evidence available, and can be undertaken as stand-alone projects in their own right, especially where an area is complex or has not been reviewed comprehensively before" (Mays, Roberts, & Popay, 2001, p. 194). Compared to systematic reviews and meta-analyses, scoping reviews tend to have 'broader' foci, such as identifying the extent and nature of extant research activity in a relatively under-researched field, identifying literature gaps, and determining if a full systematic review or meta-analysis is warranted (Protogerou, Fleeman, Dwan, Richardson, Dundar, & Hagger, 2015). To that end,

scoping reviews permit the inclusion of different study designs and population characteristics, as well as studies of various methodological qualities (Arksey & O'Malley, 2005). Given that the focus of the current research was on the identification and classification of theories and constructs used to predict condom use in young people in the SSA region, and using the results of the review to inform the development of an integrative conceptual model mapping the constructs and processes that underpin condom use in this population, a scoping review was selected as the optimal methodology for our purpose.

### **Eligibility Criteria**

Studies were eligible for inclusion in our scoping review if they (1) employed a measure of intended or actual condom use as an outcome variable; (2) provided at least one bivariate statistical association of a theoretical variable with condom use; (3) used cross-sectional, prospective, or intervention-type designs; (4) sampled young people from SSA nations in educational (i.e., elementary, high-school, college and university students) or non-educational settings (e.g., households, at-risk); and (5) were full-text peer-reviewed published articles, and unpublished theses, written in the English language. Studies were excluded if they (1) did not have condom use as a dependent variable and instead used other safer-sex behaviours (e.g., contraception, abstinence, delaying intercourse), condom-related behaviours (e.g., purchasing, carrying, negotiating condoms), condom use at first intercourse, and composite outcomes that included parameters other than condom use (e.g., an average of using condoms and engaging in illegal substance use); (2) were duplicate versions of the original study (e.g., abstract-only reports, conference presentations); or (3) were qualitative designs, government reports, and editorial/opinion pieces. There were no publication date restrictions. Following the recommendations of the African Youth Charter (African Union, 2006) we considered young people up to age 35 eligible for inclusion.

### **Retrieval**



The scoping search was conducted through PubMed and Google Scholar, up to 15 November 2015. Each individual country in SSA was used as a key word, in addition to the words “Sub-Saharan Africa”, “West Africa”, “East Africa”, “Southern Africa”, and “South Africa”. These words were combined with key terms for sexual risk-taking [“sex”, “condom”, “HIV”, “AIDS”, “sexually transmitted disease (STD)” and “sexually transmitted infection (STI)”]. Furthermore, the above terms were combined with the names of separate ILTs and variations of the constructs in McMillan and Conner’s classification system. Finally, we searched the reference sections of extant reviews of sexual risk-taking and condom use in young people from SSA nations to identify primary studies that may have been potentially missed in the first search.

### **Evidence Synthesis Strategy**

The relevant study information was extracted and organized in tabular form. Studies were described in terms of their publication date, research design, country, setting, participant type, and outcomes. The tested ILTs and the separate theoretical constructs associated with those theories were described and presented, in reverse order of frequency. Antecedents of condom use were identified and classified in reverse order of prominence, defined as the frequency with which a given antecedent is associated with increased condom use across studies. The [appraisal](#) and organization of the material was independently conducted by the two authors [who have](#) extensive experience in the field, guided by McMillan and Conner’s construct classification system. In addition to this system, the two authors used extant socio-ecological models (i.e., Bronfenbrenner, 1977; DiClemente, Salazar, Crosby, & Rosenthal, 2005) and content analysis techniques (Elo & Kyngäs, 2008) to categorize the contextual determinants of condom use appearing in the studies. Disagreements were resolved through discussion. This process (a) offered an overview of the evidence regarding the adoption of ILTs to test young peoples’ condom use in SSA; (b) reduced and summarized the multiple

overlapping ILT antecedents tested across studies; and (c) revealed a number of socio-ecological antecedents that have not been integral to any ILT applied to in the condom use literature to date. This evidence synthesis proposes a basis of an integrated and parsimonious model of young peoples' condom use in SSA, incorporating personal, social and structural antecedents, as well as the process by which these constructs impact the behaviour under investigation.

## Results

### Description of Studies and Participants

Forty-five studies published between 1992 and 2015 qualified for inclusion in the review. Study characteristics and main findings are summarised in Table 1<sup>1</sup>. Forty-three studies (95%) were peer-reviewed published papers and two (4%) were Master's theses. Thirteen SSA countries were represented, with most studies ( $k = 15$ , 33%) conducted in South Africa. Ghana, Tanzania, and Ethiopia were each represented in five studies; Uganda and Zimbabwe in three studies; Nigeria and Cameroon in two studies; and Mali, Swaziland, Botswana, Namibia, and Kenya were each represented in one study. Of these studies, 35 (78%) were conducted in urban areas, ten (22%) in rural areas, and one (2%) in a traditional agricultural (Zulu) settlement. Eighteen (40%) of these studies recruited students from secondary schools, fourteen (31%) from higher education institutions, i.e., universities and colleges, eleven (24%) from households, and two (4%) from multiple sites. All but four studies (9%) were mixed-gender, with ages ranging from 12 to 34 years. Two studies (4%) focused on young people at 'higher-risk' of HIV infection, i.e., self-reported homosexual and bisexual males, and slum dwellers. Sample sizes varied across studies and by design, with the smallest being  $N = 50$  and the largest  $N = 15,782$ . All studies collected data via questionnaire

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<sup>1</sup>A complete list of references of articles and theses included in the review is provided in Appendix A as online supplemental material.

survey techniques, with the majority ( $k = 34$ , 75%) adopting cross-sectional correlational designs, nine (20%) using prospective correlational designs, and two (4%) adopting intervention designs.

[Insert Table 1 here]

### **Antecedents of Condom Use**

[insert Table 2 here]

Table 2 provides details of the ILTs applied to predict condom use in the sample of studies. Seven ILTs were identified in the included sample of studies to explain and predict condom use. Thirty-one studies (69%) tested single ILTs in their full form, thirteen studies (29%) integrated constructs from multiple ILTs, and one study used a single theoretical construct. In all but one study (Yotebieng, Halpern, Mitchell, & Adimora, 2009), the ILTs or individual ILT variables were successful in describing, explaining, or predicting statistically significant variance in young peoples' condom use.

As expected, there was extensive conceptual overlap among constructs adopted. Constructs from the included ILTs were consolidated under the five core categories of constructs from McMillan and Conner's classification system: attitudes, norms, self representations, control perceptions, and dispositions to act. The consolidation process involved systematically matching the theoretical constructs adopted in the included studies with the core categories from McMillan and Conner's framework. The process required a review of the content of the psychometric instruments used to tap the theoretical constructs in each included study and assigning it on a 'best fit' basis to the core construct categories from McMillan and Conner's framework. This process was aided considerably by the links between typical constructs from ILTs and the framework construct categories provided by McMillan and Conner. This provided a ready-made point-of-reference and starting point when assigning constructs to framework categories. Category assignment was conducted by

each the authors independently and the classifications subsequently compared. The classifications were identical. This is unsurprising given the clarity in the definitions of the constructs used in the included studies and the availability of examples at the measurement (item) level, the clear provided by McMillan and Conner, and the relative homogeneity in measures used to tap the constructs. Many of the construct measures were adapted from the original inventories developed in conjunction with the ILTs themselves, the wording only differing in terms of the target behaviour.

Results of our matching process are provided in Table 1. Attitudes (typically captured by beliefs about risk, beliefs about severity, and advantages and disadvantages of condom use) and control perceptions (typically captured by self-efficacy, perceived behavioural control, and barriers with respect to condom use) featured most prominently in the analysis. This is unsurprising given that these factors have typically been identified as the strongest predictors of condom-use intentions and behaviour in multiple ILTs, particularly the theory of planned behaviour (both attitudes and perceived control) and social cognitive theory (control perceptions) (cf., Albarracin et al., 2001; Protogerou et al., 2014). Norms (typically captured by significant others' approval, endorsement, and support of condom use) also featured prominently, and were consistently related to condom use intentions and behaviour. This was the case in all studies that measured the constructs. Although the role of norms is identified as a key predictor in ILTs, particularly the theories of reasoned action (Fishbein & Ajzen, 2009) and planned behaviour (Ajzen, 1991), their effects on intentions and subsequent behaviour tend to be more variable and less pervasive than attitudes and control perceptions (see Armitage & Conner, 2001; Rich, Brandes, Mullan, & Hagger, 2015). This may be because health behaviours tend to vary in the extent to which they are determined by normative perceptions (McEachan et al., 2012). In the case of risk preventive behaviours like condom use, norms have been shown to have elevated importance in the prediction of

intentions (McEachan et al., 2012) relative to other health behaviours which tend to be better predicted by personal beliefs and self-efficacy. The role that self-representations play in determining condom use was less clear from these data. This is because researchers in the field of ILTs applied to condom use in SSA nations have tended to adhere to a relatively narrow set of theories and few have measured self-representations. This may be a reflection of typical practices adopting ILTs in health behavioural contexts, which tend to focus on beliefs, control perceptions, and norms, but also may reflect a tacit acknowledgement that previous research on self-representations have tended not to find strong effects in the health context (Chatzisarantis, Hagger, Wang, & Thøgersen-Ntoumani, 2009; Hagger, Asci, & Lindwall, 2004; Hagger & Chatzisarantis, 2006; Jõesaar, Hein, & Hagger, 2012). Finally, a key process outlined in many ILTs is the role that dispositions to act (captured exclusively by intention measures), which reflects individuals' motivation and the extent to which they are prepared to invest effort and plan to engage in a behaviour, as a mediator of the effects of belief-based social cognitive constructs on behaviour (Hagger, 2010). Many of the included studies adopted measures of intention, which was often the strongest and most proximal predictor of behaviour, consistent with ILTs like the theories of reasoned action and planned behaviour and protection motivation theory. There was also evidence from the included set of studies that dispositions to act, reflected by intentions, served to mediate the effect of attitudes, control perceptions, and norms on condom use behaviour. Still, this was not pervasive across all studies as some omitted measures of intention.

Prominence of constructs identified in the review was gauged by co-occurrence, i.e., the frequency with which the construct was associated with increased condom use across included studies. Attitudes featured most prominently in studies as a correlate or predictor of condom use ( $n = 36$ ), followed by perceptions of control ( $n = 34$ ), norms ( $n = 32$ ), dispositions to act ( $n = 9$ ), and self-representations ( $n = 1$ ). Dispositions to act served as

either an antecedent (in cross-sectional designs) or an outcome variable (in prospective and intervention designs). Despite conceptual overlap, constructs were sometimes more specific in their operationalization, especially in studies that conducted preliminary formative research to uncover underlying beliefs shaping the overarching five behavioural antecedents. For example, while, on the whole, the results of a study would indicate that injunctive norms predicted condom use, only one type of significant other would have a statistically significant influence on condom use. These minor variations aside, the predictors of condom use in this sample could be logically subsumed by the overarching categories of constructs specified in McMillan and Conner's framework.

### **Socio-ecological Antecedents of Condom Use**

In addition to identifying constructs from ILT, we also identified 23 [additional](#) constructs that were found to be related to condom use in at least one study (see Table 3). These constructs do not relate directly to ILTs as they are not variables derived from theories of social cognition or motivation, rather they have been identified as key constructs in socio-ecological theoretical frameworks (e.g., Bronfenbrenner, 1977). In the present review, the identified socio-ecological constructs associated with greater condom use fitted nicely with those derived from DiClemente et al.'s (2005) socio-ecological model of HIV/AIDS risk behaviour. Specifically, we identified (a) individual-difference determinants of greater condom use (e.g., older age during data collection and at first sex, optimism, low hedonism, alcohol use before or during intercourse, acceptance of sex and sexuality); (b) relational (e.g., relationship status, good partner communication, no experience of sexual violence, gender-based imbalances, past condom use in relationship); (c) community (e.g., involvement in health promotion programmes); and (d) societal/structural (e.g., religion and religiosity influences, high SES, condom pricing and availability). Relational constructs appeared most prominently across the current sample of studies, while community constructs appeared least

prominently. None of the reviewed studies included family characteristics as predictors of condom use, even though research has suggested that family characteristics such as family structure, cohesiveness, parental monitoring and parent-adolescent communication about sex are associated with young peoples' condom use (DiClemente et al., 2001). However, certain family characteristics such as parental influences may have been encompassed by the norm construct from ILTs.

[insert Table 3 about here]

### **An Integrated Model to Describe Young Peoples' Condom Use in SSA**

We propose an integrated model that encompasses the most prominent determinants of condom use in young people from SSA nations, and the processes by which these determinants predicted condom use. Development of the model was informed by the factors identified in our scoping review of the social cognitive and motivational factors from the ILTs, and the additional factors derived from socio-ecological theories, and guided by McMillan and Conner's (2007) theoretical framework. The proposed model is illustrated in Figure 1. Our starting point was the identification of condom use as the primary dependent variable. Based on MacMillan and Conner's framework, disposition to act, represented by intentions, motivation stage of change and action plans, was proposed as the most proximal antecedent of condom use. Disposition to act was proposed to be predicted by attitudes (e.g., beliefs and evaluations about condom use, affect, outcome expectancies), norms (e.g., peer attitude towards condom use, significant other perceived approval), control perceptions (e.g., condom use self efficacy, perceived behavioural control), and self-representations (e.g., moral norms). Disposition to act, as the key intentional or motivational variable in the model, therefore served as a mediator of the effects of the social cognitive constructs on behaviour, consistent with the majority of the ILTs included in the studies identified in the current review (e.g., the theory of planned behaviour) and with McMillan and Conner's framework.

Alongside this, we included the variables derived from socio-ecological frameworks as both direct and indirect predictors of condom use. The indirect effect is consistent with the notion proposed by proponents of many social-cognitive theories that the effects of such variables serve as background information affecting the development of beliefs about behaviour, and that their effects should be mediated by the social cognitive factors relating to the behaviour (Blanchard et al., 2009; Hagger et al., 2007; Hoyt, Rhodes, Hausenblas, & Giacobbi, 2009; Walker, Courneya, & Deng, 2006). The direct effects are consistent with the notion proposed by many theorists that individual difference and demographic factors likely affect behaviour independent of social cognitive variables because they relate to unmeasured implicitly-held beliefs or response tendencies affecting behaviour beyond the individual's awareness (Conner & Abraham, 2001; Hagger, Chatzisarantis, & Harris, 2006; Rhodes, Courneya, & Jones, 2004; Rhodes, Fiala, & Nasuti, 2012). Both processes are proposed to affect behaviour and their contributions indicate the relative impact of implicit and explicit processes on behaviour.

[insert Figure 1 about here]

### **Discussion**

The purpose of the present review was to develop an integrated theoretical model of condom use for in young people from SSA nations. We conducted a systematic scoping review of studies examining correlates of condom use in young people from SSA nations adopting psychological, behavioural, and socio-ecological theories. We identified forty-five studies that met inclusion criteria and we extracted the most frequently used theories and constructs adopted to explain condom use in the target population. As there was variability in terms and measures used to tap psychological constructs from the theories, and we used McMillan and Conner's (2007) framework of core constructs from theories of health



behaviour to guide the classification of constructs identified in the scoping review into a set of consolidated categories. The model is depicted in Figure 1.

The model identifies disposition to engage in condom use as the key antecedent of condom use, mediating the effects of attitudes, control perceptions, norms, and self-representations. This mediated path is a consistent prominent process in the social cognitive models identified in the scoping review (e.g., the theory of planned behaviour), and in the process outlined in McMillan and Conner's framework. Furthermore, our model incorporates socio-ecological determinants of condom use, namely, relationship characteristics, individual differences, community and wider society structure influences, which are proposed to be direct predictors of condom use, with additional direct effects on disposition to act. This gives rise to potentially two pathways by which the socio-ecological factors impact condom use, direct effects, and indirect effects mediated by disposition to act. The direct effects are proposed to reflect generalized tendencies of the socio-ecological factors to enact behaviour beyond the awareness of the individual or through pathways that are not deliberative (Hofmann, Friese, & Wiers, 2011). The indirect effects reflect the role that such factors play in informing decisions to act, that is, a more intentional route to action (Head & Noar, 2014).

Focusing on the prominence of factors relating to condom use, of all the social-cognitive antecedents identified in studies included in the current analysis, attitudes were most prominently linked to condom use, followed by control perceptions, and norms. There was a comparatively minor role for self-representations as a predictor of condom use, based on current evidence, but this must be interpreted in light of the fact that few studies have measured self-representations with respect to condom use in these populations. Previous research has identified similar pattern of condom use antecedents. For example, Protogerou et al.'s (2012) review of the applicability of the theory of planned behaviour to sexual risk behaviour in SSA nations revealed attitudes as the most prominent antecedent of condom use.

Similarly, attitudes have been found to be the strongest correlates of young peoples' condom use in reviews of the international literature (Albarracin et al., 2001; McEachan, Conner, Taylor, & Lawton, 2011; Sheeran et al., 1999). Therefore, the pattern of results obtained in the present study aligns with extant evidence syntheses in the SSA and international literature, and is in contrast to arguments suggesting that condom use is mostly determined by communal and group influences in SSA nations (e.g., Campbell & Murray, 2004).

Of the socio-ecological constructs, relationship characteristics feature most prominently as predictors of condom use in the integrated model. Specifically, compared to females, our review revealed that males tend to have more decision-making power and control over condom use in the SSA population. Furthermore, compared to being in an exclusive relationship, being involved in casual relationships or perceiving oneself to be single, is more frequently linked to greater condom use. Also, having engaged in condom use in the past in a relationship is another frequent antecedent of condom use. These relational influences on condom use are consistent with the extant SSA and international literature (Eaton et al., 2003; Manlove, Ryan, & Franzetta, 2007; Woolf & Maisto, 2008). In terms of individual-difference constructs, age plays a key role, with being older at the time of data collection most frequently associated with condom use; however, research is inconclusive regarding the impact of age on condom use (Caldeira et al., 2009; Johnson, Scott-Sheldon, Huedo-Medina, & Carey, 2011). Our review encompassed a wide age range of young people and potentially shows age effects; however, further research is needed to ascertain whether condom use differs as a function of age in this population.

Regarding wider social influences on condom use, we identified low religiosity and small involvement with religion to be linked to greater condom use – consistent with previous findings (Protoherou et al., 2014; Viana, Faúndes, Mello, & Sousa, 2007). Community influences were also related to condom use in the model, *specifically*, empowerment

experienced by participating in community health promotion programmes. This suggests that participating in community health programmes leads to protective (sexual) health behaviour, through self-empowerment, or, individual capacity (e.g., Hagquist & Starrin, 1997). With the inclusion of socio-ecological determinants of condom use in our model, we align with a body of SSA and international research that argues for causal pathways between the socio-ecological constructs and HIV-risk taking behaviour (e.g., Gupta, Parkhurst, Ogden, Aggleton, & Mahal, 2008; Sumartojo, Doll, Holtgrave, Gayle, & Merson, 2000).

Overall, our model proposes a broader approach to the study of condom use and recognises that HIV-prevention behaviour is jointly shaped by personal characteristics and the social environment, and our incorporation of socio-ecological constructs alongside personal social-cognitive constructs from ILTs illustrates this innovation. We do not suggest that the influence of social-ecological factors on condom use is confined to SSA populations alone. We view socio-ecological constructs as important determinants of condom use, and suggest that the paucity of research including such variables in tests of theoretical models of condom use and HIV-risk behaviour is a weakness in the literature.

One of the key features of the current integrated model is that the social-ecological factors are assumed to impact on behaviour directly and indirectly through disposition to act, that is, motivational factors like intentions. Consistent with research on social cognitive models applied to health behaviour, the direct effects reflect the tendency of the socio-ecological factors to influence behaviour independent of the individual's reflective, deliberative consideration of engaging in the behaviour. These effects, therefore, reflect influences on behaviour that occur beyond the individual's awareness. Examples of the processes that reflect a non-conscious pathway include the structuring of the environment ways to facilitate behavioural engagement (e.g., surveillance, 'nudges') (e.g., Lewis & Eves, 2012), and the use of strategies and messages that are not processes at the conscious level or

only processes minimally and impact on implicit factors that impact on behaviour (e.g., subliminal messages, cognitive priming; Eves, Scott, Hoppé, & French, 2007; Henderson, Orbell, & Hagger, 2009). These two pathways or routes to behaviour are consistent with dual process theories which propose behaviour to be a function of both deliberative and spontaneous pathways to action, the relative contribution of each pathway varying with behaviour type and context (e.g., Hofmann, Friese, & Wiers, 2008; Strack & Deutsch, 2004). The current integrated model provides an indication that these pathways exist, and provides a framework for future researchers to test the relative contribution of the socio-ecological constructs on condom use in young people in SSA nations, directly, or through an indirect route mediated by disposition to act.

### **Utility of the Model in Guiding Research and Intervention**

Our current analysis aimed to distil the large number of psychological constructs identified in ILTs as antecedents of condom use into a comprehensive yet parsimonious evidence-based and integrated model that is fit-for-purpose in accounting for condom use behaviour in sub-Saharan Africa. This presented a considerable challenge due to the large number of ILTs that have been adopted and applied to predict condom use in this population, and the diversity in terms and definitions provided for the constructs of interest. Our approach was to synthesise these constructs by classifying them into conceptually-similar categories based on a systematic review of their definition and measurement guided by McMillan and Conner's framework. Our results indicate that the relative diversity in the large number of ILTs and constructs reflects a 'jangle fallacy' (Block, 1995) or the 'deja variable' phenomenon (Hagger, 2014) – that the preponderance of multiple constructs in a literature with the same definition, content, and function, but labelled differently. Our systematic categorisation in the current article has reduced this diverse number of constructs into eight antecedents of condom use: four social-cognitive (attitudes, control perceptions, norms, and

self-representations), and four socio-ecological (relational, individual differences, societal, and community). Considering that social behaviours like condom use are complex and caused by multiple factors, our current model is relatively parsimonious but sufficient in accounting for the possible influences on condom use in SSA based on currently available data.

A key aim of the current model is to guide future research. The model provides a set of readily testable hypotheses as to the social cognitive and socio-ecological constructs likely to affect condom use in SSA and the processes by which the constructs exert their effects. As the model represents a synthesis of current research, its overall validity as a comprehensive explanation of condom use, that is, its nomological validity, has yet to be tested. We therefore advocate that researchers in this context conduct large-scale rigorous tests of its predictions based on a strict nomological approach. Critical in such tests is the selection of valid and reliable instruments that are fit-for-purpose in tapping the constructs, but also the adoption measures with relatively few items to reduce response burden and potential for method variance. There are ample examples in the included studies of the measures that test the proposed model constructs that conform to these specifications. Once such data is collected, we strongly advocate the use of confirmatory analytic approaches (e.g., structural equation modelling, path analysis) to test the proposed network of relations among constructs. Such research will permit the verification or falsification of the model and provide important formative research to advance the development of theoretical models in this context. It will also highlight the relative contribution (i.e., the strength of the proposed effects) that each factor makes to predicting intentions, and actual engagement in, condom use in SSA. Data on effect sizes is extremely important when it comes to identifying viable targets for intervention.

How could the current model drive intervention efforts? A key aim of ILTs is to provide an evidence base to inform the development of behavioural interventions that are

optimally effective in changing health behaviours (Davis, Campbell, Hildon, Hobbs, & Michie, 2015). This perspective is based on the assumption that psychological factors are manipulable through intervention. If such factors are found to be strongly related to behaviour, then affecting a change in those factors through manipulation techniques ought to lead to a concomitant change in behaviour. Advances in the science of behaviour change has begun to map the strategies and techniques that interventionists have used to change behaviour, and how those techniques map on to psychological constructs (e.g., Davis et al., 2015). Based on these advances, psychological models, such as the integrated model proposed in the current research, will be valuable in predicting behaviour by identifying targets for intervention and pointing to the types of techniques that are likely to be effective. In the context of the current model, it seems that techniques that foster positive attitudes (e.g., persuasive communications, information provision), conducive norms (e.g., support from significant others and partners), high behavioural control (e.g., goal setting, experiences of success), and adaptive self-representations (e.g., autonomy support, positive feedback) are likely to promote greater condom use. Similarly, tailoring messages to address specific deficits on socio-ecological variables such as individual differences (e.g., introversion) and societal/structural (e.g., condom availability) constructs will likely enhance the efficacy of behavioural interventions. We must, however, stress that recommendations for practice based on the current model may be premature in the absence of corroborating evidence of its validity in accounting for substantive variance in condom use, and the relative contribution of the component constructs. We therefore reiterate our call for strict tests of model hypotheses in future research.

### **Study Strengths and Limitations**

This review offers the first integrated theoretical model of young peoples' condom use in the SSA region. The model is unique as it encompasses constructs from extant research

on individual-level and socio-ecological theories, and proposes the processes by which these constructs impact condom use. **Importantly, the model is a synthesis of multiple factors and processes from the extant literature and our systematic, theory-guided classification reduced these constructs into a set of core predictors that reflects parsimony and sufficiency in the predictors of condom use in this population.** The model is intended as a guide for future research to examine the factors that account for condom use among young people from SSA nations and associated processes. It may also be used as a basis for the development of condom use promotion interventions as it identifies the variables likely to be linked to greater condom use. Mapping the identified constructs on to messages, strategies and techniques designed to change the constructs, may be useful in promoting more effective condom promotion interventions. A further strength of the present analysis is that we followed a systematic literature search strategy (i.e., scoping review) with a priori eligibility criteria. Our review was comprehensive drawing multiple theories from the social cognitive and socio-ecological traditions. Precision and accuracy of our findings enhanced by the fact that we organized, classified and synthesised the extracted information on the basis of existing summary systems of ILT constructs (McMillan & Conner, 2007), socio-ecological frameworks (DiClemente et al., 2005), and content analyses techniques (Elo & Kyngäs, 2008).

We also acknowledge the limitations of the current research. While our model has been comprehensive in identifying and including the social cognitive and socio-ecological factors that impact condom use in young people from SSA nations, we recognise that some salient factors that have not featured in the extant literature on condom use in this population to date but may be potentially influential. For example, we did not include specific affective responses or anticipated emotions in the current model. The studies included in this review did not test for emotion-related predictors of condom use in this population within the context

of social cognitive models, and this seems to be an important omission. Emotion-related constructs such as anticipated positive affect derived from sexual intercourse and anticipated regret from non-condom use are likely to be important predictors of intended and actual condom use (e.g., Sandberg & Conner, 2008). Future research should aim to incorporate these constructs as potential antecedents of condom use in tests of social cognitive and socio-ecological models predicting condom use in young people in SSA nations. Our model may, therefore, be subject to revision to include emotion-related constructs as new evidence comes to light. Related to this, we have not yet formally tested the proposed integrated model. We look to future empirical research to establish the validity and applicability of our model.

Another limitation mirrors limitations of the reviewed studies; specifically, few studies tested the relations between socio-ecological constructs and condom use. A number of studies incorporated the impact of the social ecological constructs retrospectively as a means to explain or expand the results obtained from testing the ILTs. Future research should incorporate these factors as a matter of course alongside social cognitive factors, and include them in omnibus tests of the integrated model to establish their relative contribution to explaining variance in condom use.



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Table 1

*Description of Included Studies and Condom Use Outcomes*

Study <sup>a</sup> ; design	Country; setting	Participants	Constructs measured (overarching categories) <sup>b</sup>	Linkages between theoretical constructs and condom use <sup>c</sup>
Abraham, Rubaale, & Kipp (1995); survey; cross-sectional.	Uganda, Kabarole district; urban and rural secondary schools.	220 males and 167 females; mean age = 18.8.	Condom use self-efficacy (control perceptions); perceived severity and susceptibility (attitudes).	Control perceptions (+).
Adedimeji et al. (2008); survey; cross-sectional.	South West Nigeria; Ibadan metropolis; slum dwellers; households.	Sexually active 448 males and 338 females; aged 15-24.	Risk perceptions (attitudes); perceived support from peers, parents, community figures (injunctive norms); condom use self-efficacy (control perceptions).	Females: attitude evaluation barriers (-); norms (+). Males: attitude evaluation (+); control perceptions (+); norms (0).
Adih & Alexander (1999); survey; cross-sectional.	Ghana; Yilo-Krobo district; predominately rural area; households.	Sexually active 601 males; aged 15-24.	Perceived susceptibility, benefits and barriers (attitudes); perceived support from peers, sexual partner (injunctive norms); self-efficacy (control perceptions). Self-efficacy (control perceptions).	Attitude evaluation susceptibility (+); attitude evaluation barriers (-); control perceptions (+); norms (+).
Asante, Osafo, & Doku (2015); survey; cross-sectional.	Ghana; Accra; university.	518 male and female students; aged 20-30.	Self-efficacy (control perceptions).	Control perceptions (+).
Assenga (2009); survey; cross-sectional.	Tanzania; Arusha region; in-school and out-school youths.	372 males and females; aged 15-24.	Self-efficacy (control perceptions); perceived barriers (attitudes).	Control perceptions (+). Attitudes (0).
Baah-Odoom & Riley (2012); survey; prospective.	Ghana; Accra; school and university students.	460 males and females; aged 15-28.	Evaluation of advantages and disadvantages (attitudes); perceived support from friends, parents, religious leaders	Attitudes (+); norms (+); control perceptions (+); disposition to act (+); self-representations (+).

Boer & Mashamba (2005); survey; cross-sectional.	South Africa; Venda; school.	201 Black male and female students; mean age = 17.1.	(injunctive norms); perceived behaviour control (control perceptions); intentions (disposition to act); moral norms (self-representations). Perceived vulnerability, severity and negative consequences of condom use (attitudes); self-efficacy, perceived behaviour control (control perceptions); perceived approval by sexual partner, friends, parents, doctor, public health campaign (injunctive norms).	Attitudes (+); norms (+); control perceptions (+);
Boer & Mashamba (2007); survey; cross-sectional.	South Africa, Venda, university.	200 male and female students; mean age = 23.1.	Perceived vulnerability, severity and negative consequences of condom use (attitudes); self-efficacy, perceived behaviour control (control perceptions); perceived approval by sexual partner, friends, parents, doctor, public health campaign (injunctive norms).	Males: attitudes (+); control perceptions (0); norms (+). Females: attitudes (+); control perceptions (+).
Bogale, Boer, & Seydel (2010); survey; cross-sectional.	Ethiopia; rural Amhara Highland; community.	200 illiterate or low-literate females; aged 13-24.	Perceived vulnerability, severity and negative consequences of condom use (attitudes); self-efficacy, perceived behaviour control (control perceptions); perceived approval by sexual partner, friends, parents, doctor, public health campaign (injunctive norms).	Attitudes (+); norms (+); control perceptions (0).

Boileau, Zunzunegui, & Rashed (2009); survey; cross-sectional.	Mali; Bamako; in-school and out-school youths; various sites.	531 sexually active males and females; aged 15-24.	Evaluations towards condom use and sex (attitudes); peer and parental norms (injunctive and descriptive norms); perceived behavioural control (control perceptions).	Attitudes (+); descriptive norms (+); control perceptions (+).
Bosompra (2001); primary research; cross-sectional.	Ghana; university residence halls.	201 male and female university students; aged 19 - 29.	Outcome expectancies and evaluations (attitudes); perceived approval and support by sexual partner, friends, parents and doctor (injunctive norms).	Attitude evaluation (+); norms (+).
Brink (2012); survey; prospective.	South Africa; Stellenbosch; university.	50 males self-identified as gay or bisexual; aged 18-26.	Attitudes towards condom use (attitudes); perceived approval by significant others (injunctive norms); perceived behavioural control (control perceptions).	Attitudes (-); norms (+); control perceptions (0).
Bryan, Kagee, & Broaddus (2006); survey; prospective.	South Africa; Cape Town, secondary school; low-income township.	261 predominately Coloured males and females; aged 14-19.	Attitudes towards condom use (attitudes); perceived approval by significant others (injunctive norms); self-efficacy (control perceptions); intended safer-sex (disposition to act).	Attitude evaluation (+); norms (+); control perceptions (+), disposition to act (+).
Devine-Wright, Abraham, Onya, Ramatsea, Themane, & Aarø (2015); survey; cross-sectional.	South Africa; Mankweng; secondary schools.	893 male and female students; aged 12-17.	Significant others' condom use and approval (descriptive and injunctive norms); self-efficacy (control perceptions); perceived susceptibility and condom meaning (attitudes).	Injunctive norms (+); control perceptions (+); attitudes (+).
Edem & Harvey (1995); survey; cross-sectional.	Nigeria; Akwa Ibom State; university.	221 male and 171 female undergraduates; aged 18-24.	Perceived susceptibility, benefits and barriers (attitudes); condom	Attitude - benefits (+); attitude - barriers (-); norms (+).

			use discussion with and endorsement by family, friends and health professionals (norms).	
Eggers, Aarø, Bos, Mathews, de Vries (2014); survey; prospective.	South Africa; Cape Town; high-schools.	Sexually active 1,006 male and female students; mean age=14.31.	Evaluations towards condom use and risk perception (attitudes); self-efficacy (control perceptions); perceived approval from parents and friends (injunctive norms); intentions (disposition to act).	Attitude evaluation (+); control perceptions (+); norms (+); disposition to act (+).
Giles, Liddell, & Bydowell (2005); survey; prospective.	South Africa; traditional Zulu agricultural settlement; community.	152 male and female youth; mean age = 20.3.	Outcome evaluations (attitudes); sexual partner, parental, peer and teacher endorsement (injunctive norms); intentions (disposition to act).	Attitudes (+); norms (+); control perceptions; disposition to act (+).
Girma, Assefa, & Tushunie (2004); survey; cross-sectional.	Ethiopia; Agaro Town; high school.	360 male and female students; mean age = 17.65	Perceived susceptibility, severity, benefits and barriers (attitudes); peoples', sexual partner and health care provider opinions about condom use (descriptive norms); self-efficacy (control perceptions).	Males: attitudes (+); norms (+); control perceptions (+). Females: norms (+); attitude evaluation (0); control perceptions (0).
Groenenboom, Van Weert, & Van den Putte (2009); survey; cross-sectional.	Tanzania (Arusha) and Zambia (Kabwe); high-schools.	294 Tanzanian and 273 Zambian male and female students; age range = 10-19.	Condom use, affect and outcome evaluation (attitudes); perceived significant others' behaviour and endorsement (injunctive and descriptive norms); self-efficacy (control perceptions).	In both Tanzanian and Zambian samples: attitude affect and evaluation (+); norms (+); control perceptions (0).



Heeren, Jemmott, Mandeya, & Tyler (2007); survey; cross-sectional.	South Africa; Eastern Cape; university.	251 male and female students; mean age = 22.4.	Affect and evaluation regarding condom use (attitudes); perceived approval by sexual partner, mother, father and friends (injunctive norms); perceived behavioural control, self-efficacy (control perceptions).	Attitudes (+); norms (+); control perceptions (+).
Heeren, Jemmott, Mandeya, & Tyler (2009); survey; prospective.	South Africa; Eastern Cape; university.	320 male and female undergraduates; mean age = 23.4.	Condom use affect and outcome evaluation (attitudes); perceived approval by sexual partner, mother, father and friends (injunctive norms); perceived behavioural control, self-efficacy (control perceptions); intentions (disposition to act).	Attitude affect (+); norms (+); control perceptions (+); disposition to act (+).
Hendriksen, Pettifor, Lee, Coates, & Rees (2007); survey; cross-sectional.	South Africa; national youth survey; households.	7686 sexually experienced males and females; aged 15-24.	Self-efficacy (control perceptions).	Control perceptions (+).
Jemmott, Heeren, Ngwane, Hewitt, Jemmott, Shell, & O'Leary (2007); survey; cross-sectional.	South Africa; Eastern Cape; Mdantsane township; schools.	149 male and 241 female Xhosa Black adolescents; age range = 10-16.	Condom use affect and outcome evaluation (attitudes); significant others' approval (injunctive norms); perceived behavioural control (control perceptions).	Attitude affect and evaluation (+); norms (+); control perceptions (+).
Kalolo & Kibusi (2015); survey; cross-sectional.	Rural Tanzania; Newala district; secondary schools.	200 male and 203 female students; aged = 14-17.	Condom use affect and outcome evaluation (attitudes); endorsement by parents, friends, teachers and religious leaders (injunctive norms); perceived	Attitudes (+); injunctive norms (0); control perceptions (+).

			behavioural control (control perceptions).	
Karim, Magnani, Morgan, & Bond (2003); survey; cross-sectional.	Ghana; national survey; households.	5,632 unmarried male and female youth; aged 12-24.	Peer influence regarding sexual behaviours (group norms); self-efficacy (control perceptions).	Group norms (0); control perceptions (+).
Katikiro & Njau (2012); survey; cross-sectional.	Tanzania; Dar es Salaam; out-school youths; administrative wards.	186 male and 162 females; aged 15-24.	Perceived barriers, benefits and susceptibility, affect (attitudes); perceived confidence regarding condom use and negotiation (control perceptions).	Attitude affect and evaluation (+); control perceptions (0).
Lugoe & Rise (1999); survey; cross-sectional.	Northern Tanzania; Arusha; secondary schools.	Sexually active 528 male and female pupils; mean age = 17.8	Outcome evaluations (attitudes); perceived endorsement by sexual partner, best Friend, teachers; parents, religious leaders, and siblings (injunctive norms); perceived behavioural control (control perceptions).	Attitudes (+); norms (+); control perceptions (+).
Meekers & Klein (2002); intervention; social marketing; mass-media.	Urban Cameroon; Yaoundé and Douala; households.	1,284 unmarried sexually experienced males and females; aged 15-24.	Condom use affect and perceived severity and risk (attitudes); self-efficacy (control perceptions); perceived support by parents and friends (injunctive norms).	Attitudes (+); control perceptions (+); norms (+).
Mehra, Östergren, Ekman, & Agardh (2014); survey; cross-sectional.	South-western Uganda; Mbarara; university.	Sexually active 693 male and 486 female students; median age = 23.	Condom use self-efficacy (control perceptions); peer condom use (descriptive norms).	Control perceptions (+); norms (+).

Molla, Astrøm, & Brehane (2007); survey; prospective.	Rural Ethiopia; Butajira, Meskan and Mareko Districts; households.	802 males and females; aged 15-24.	Condom use evaluation (attitudes); perceived endorsement by significant others and significant others' condom use (injunctive and descriptive norms); perceived behavioural control (control perceptions); intentions (disposition to act).	Attitudes (+); injunctive norms (+); descriptive norms (+); disposition to act (+); control perceptions (+).
Mulatu, Adamu, & Haile (2000); survey; cross-sectional.	Ethiopia; towns of Awasa, Bahir Dar, Dessie, Dire Dawa, and Jimma; secondary schools.	Sexually active 367 males and females; aged 14-24.	Perceived benefits, barriers and severity (attitude evaluation); condom use self-efficacy (control perceptions); perceived endorsement by friends, partners, close relatives and parents (injunctive norms).	Attitude evaluation benefits (+); attitude evaluation barriers (-); control perceptions (+); norms (+).
Peltzer (2000); survey; cross-sectional.	South Africa; Northern Cape; university.	60 male and 146 female students; mean age = 20.9.	Normative beliefs of other people, sexual partner and health care provider (norms); perceived severity, benefits and barriers (attitude evaluation); condom use self-efficacy (control perceptions).	Norms (+); attitude evaluation susceptibility (+); attitude evaluation barriers (-); control perceptions (+).
Protogerou, Flisher, Wild, & Aarø (2013); survey; prospective.	South Africa; Cape town; university.	74 males and 315 female undergraduates; mean age = 19.1.	Condom use evaluation (attitudes); Endorsement of parents, friends, sexual partner and religion (injunctive norms); perceived behavioural control (control perceptions).	Attitudes (+); norms (+); control perceptions (+); disposition to act (+).
Sacolo, Chung, Chu, Liao, Chen, Ou, Chang, & Chou	Northern Swaziland; four schools.	403 male and female students; aged = 12-19.	Mother, father, partner, and friend norms (norms); attitudes	Attitudes (+); norms (+); control perceptions (+).

(2013); survey; cross-sectional.			towards condoms (attitudes); condom use self-efficacy (control perceptions).	
Sayles, Pettifor, Wong, MacPhail, Lee, Hendriksen, Rees, & Coates (2006); survey; cross-sectional.	South Africa; national survey; households.	Sexually active 3,519 males and 3,890 females; aged 15-24.	Self-efficacy (control perceptions).	Control perceptions (+).
Schaalma, Aarø, Flisher, Mathews, Kaaya, Onya, Ragnarson, & Klepp (2009); intervention; baseline data.	South Africa (Cape Town, Polokwane) and Tanzania (Dar es Salaam); secondary schools.	15,782 students; aged = 12-15.	Attitudes towards condoms, perceived susceptibility and severity (attitudes); condom use self-efficacy (control perceptions); perceived injunctive and descriptive norms (norms).	Attitudes (+); norms (+); control perceptions (+).
Taffa, Klepp, Sundby, & Bjune (2002); survey; cross-sectional.	Ethiopia; Addis Ababa; schools and administrative units (kebeles).	561 in-school and out-school youth; aged = 15-24.	Attitudes towards condoms and barriers (attitude evaluation); perceived norms of peers, parents, and teachers (norms); condom use self-efficacy (control perceptions).	Norms (+); attitudes towards condoms (+); attitude evaluation barriers (-); control perceptions (+).
Tarkang (2013); survey; cross-sectional.	Rural Cameroon; Mponge; secondary schools.	210 female students; aged = 16-24.	Perceived severity, susceptibility, benefits and barriers (attitude evaluation); condom use self-efficacy (control perceptions).	Attitude evaluation susceptibility (+); attitude evaluation benefit (0); attitude evaluation barriers (0); control perceptions (+).
Thathana (2014); survey; cross-sectional.	Botswana; national survey; households.	Sexually active 1,289 males and females; aged =18-34.	Condom use outcome expectancies (attitude evaluation); condom use self-efficacy (control perceptions).	Attitude evaluation (+); control perceptions (+).

Van Rooy, Mufune, Indongo, Matengu, Libuku, & Schier (2014); survey; cross-sectional.	Namibia; Windhoek; university.	578 males and female undergraduates; median age 19.	Perceived risk and severity (attitude evaluation); condom use self-efficacy (control perceptions); social support (norms).	Attitude evaluation (0); norms (+); control perceptions (+).
Wilson & Lavelle (1992); survey; cross-sectional.	Zimbabwe; university (open day for secondary school pupils).	343 male and 220 female secondary school pupils; male mean age = 18.5, female mean age = 17.69.	Perceived susceptibility, severity, barriers and condom use attitudes (attitude evaluation); social group support (norms).	Condom use attitudes (+); attitude evaluation barriers (-); norms (+).
Wilson, Manual, & Lavelle (1991); survey; cross-sectional.	Zimbabwe; Mutare city; college.	181 male and 171 female teacher trainees; mean age = 21.8.	Perceived susceptibility, severity, barriers and condom use attitudes (attitude evaluation); social group support (norms).	Males: attitude evaluation susceptibility (+); attitude evaluation severity (+); attitude evaluation barriers (-); norms (+). No significant associations for females.
Wilson, Zenda, McMaster, & Lavelle (1992); cross-sectional; survey.	Zimbabwe; Harare; college.	179 male and 123 female teacher trainees; male mean age = 25. 1; female mean age = 24.0	Attitudes towards condom use, outcome expectancies and perceived barriers (attitudes); Perceived endorsement of sexual partner, friends and parents (norms); perceived behavioural control (control perceptions).	Males: attitude evaluation (+); control perceptions (+); norms (0). Females: attitude evaluation (+); norms (0); control perceptions (0).
Ybarra, Korchmaros, Kiwanuka, Bangsberg, & Bull (2013); survey; prospective.	Uganda; Mbarara; secondary schools.	Sexually active 390 male and female pupils; aged 12-18.	Subjective norms (norms); behavioural skills (control perceptions); intentions (dispositions to act).	Control perceptions (+); norms (0); disposition to act (0).
Yotebieng, Halpern, Mitchell, & Adimora (2009); survey; cross-sectional.	Kenya; Nairobi; secondary school.	Sexually experienced 214 males; aged 14-20.	Perceived HIV susceptibility and prevalence, condom use	Attitudes (0).

benefits and barriers (attitude evaluations).

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*Note.* <sup>a</sup>Studies are arranged in alphabetical order by first author's name. <sup>b</sup>Theoretical constructs are matched with overarching (attitudes, norms, self-representations, perceptions of control, and dispositions to act) and specific (attitude evaluation susceptibility, attitude evaluation severity, attitude evaluation barriers, descriptive norms, injunctive norms, group norms, control perceptions) categories from McMillan and Conner's (2007) construct classification system. <sup>c</sup>Construct categories and links with condom use measure. A plus (+) sign denotes a statistically significant positive link (correlation or prediction or change) with condom use, a negative (-) sign denotes a statistically significant negative link with condom use, and zero (0) denotes a link that was not statistically significant. Only links reported in the studies are included in table. Full references of studies included in the review are listed in Appendix A as online supplemental material.

Table 2

*Individual-Level Theories (ILTs) and Constructs Included in the Present Review*

Theory (key developers) and frequency <sup>a</sup>	Theory description	Study <sup>b</sup>
Theory of Reasoned Action & Planned Behaviour (TRA, TPB: Ajzen & Fishbein, 1977; Ajzen, 1991). <i>k</i> = 19	The TPB is an extension of the TRA and postulates that the principal determinant of a behaviour is the individual's intention to engage in it. Intentions are determined by attitudes (i.e., positive or negative evaluations of the behaviour in question), subjective norms (i.e., beliefs about whether significant others approve or disapprove of the behaviour), and perceived behavioural control (i.e., subjective perceptions of the ease or difficulty of the behaviour). Attitudes, subjective norms, and perceived behaviour control are, according to the theory, determined by underlying salient beliefs (i.e., those most easily accessible from memory).	Baah-Odoom & Riley (2012); Boileau et al. (2009); Bosomptra (2001); Brink (2012); Bryan et al. (2006); Devine-Wright et al. (2015); Giles et al. (2005); Groenenboom et al. (2009); Heeren, et al. (2007); Heeren et al. (2009); Jemmott et al. (2007); Kalolo & Kibusi (2015); Lugoe & Rise (1999); Molla et al. (2007); Protogerou et al. (2013); Sacolo et al. (2013); Schaalma et al. (2009); Taffa et al. (2002); Wilson et al. (1992).
Health Belief Model (HBM: Rosenstock, Strecher, & Becker, 1988). <i>k</i> = 6	The HBM comprises four health beliefs which are seen as precursors / predictors of health behaviour: (a) perceived susceptibility to a disease, (b) perceived severity of a disease, (c) perceived benefits of adopting health protective behaviour, and (d) perceived barriers to adopting health protective behaviour. The HBM postulates that people are more likely to adopt health protective behaviours if they believe that: they are susceptible to illness; the consequences of the illness are serious; an effective solution exists; they can overcome barriers to adopting the health protective behaviour.	Edem & Harvey (1995); Katikiro & Njau (2012); Tarkang (2013); Wilson & Lavelle (1992); Wilson et al. (1991); Yotebieng et al. (2009).

<p>Social Learning/ Cognitive Theory (SLT, SCT: Bandura, 1978). <math>k = 2</math></p>	<p>SLT/SCT primarily focuses on vicarious human learning, in the absence of overt / extrinsic reinforcement, i.e., through watching, observing, reading. The theory further postulates that one's confidence to carry out a (health protective) behaviour (self-efficacy) is highly predictive of adopting that behaviour, as well as a prerequisite for behaviour change, in general.</p>	<p>Sayles et al. (2006); Thathana (2014).</p>
<p>Information-Motivation-Behavioural skills model (IMB: Fisher &amp; Fisher, 1992). <math>k = 1</math></p>	<p>The IMB model argues that health protective behaviour is influenced by: (a) information about how to prevent an illness; (b) motivation to consistently engage in non-risky behaviours; and (c) behavioural skills to correctly enact these behaviours. The impact of information and motivation on the onset and sustainability of one's health protective behaviour are mediated by behavioural skills.</p>	<p>Ybarra et al. (2013).</p>
<p>Use of several constructs associated with multiple of the included ILTs. <math>k = 13</math></p>	<p>Constructs from HBM, SCT and Health Action Process approach (HAPA; Schwarzer, 1992). Constructs from HBM, SLT/SCT and Aids Risk-Reduction Model (ARRM; Catania, Kegeles, &amp; Coates, 1990). Constructs from HBM and SLT. Constructs from HBM, ARRM and TRA. Constructs from TPB and Protection Motivation Theory (PMT; Rogers, 1983). Constructs from HBM, TRA, ARRM, and SCT. Constructs from SCT and ARRM. Constructs from SLT/SCT. Constructs from HBM, SLT/SCT and TRA. Constructs from SLT/SCT and TRA/TPB. Constructs from HBM, TRA/TPB and SLT/SCT. Constructs from HBM and SLT/SCT. Constructs from HBM and TRA/TPB.</p>	<p>Abraham et al. (1995) Adedimeji et al. (2008). Adih &amp; Alexander (1999). Assenga (2009). Bogale et al. (2010). Girma et al. (2004). Hendriksen et al. (2007). Karim et al. (2003). Meekers &amp; Klein (2002). Mehra et al. (2014). Mulatu et al. (2000). Peltzer (2000). Van Rooy et al. (2014).</p>



The HAPA suggests that beliefs about susceptibility to infection, severity of infection and the likely consequences of a behaviour (e.g. the costs and benefits of condom use) may be important prerequisites of health protective behaviour, but they may only affect behaviour by prompting intention formation and enhancing perceived self-efficacy.

The ARRM includes elements from other ILTs, primarily the HBM and SCT, and proposes a three-stage process model for explaining and predicting behaviour change in relation to sexual transmission of HIV/AIDS. The stages include recognising and labelling one's behaviour as high risk; making a commitment to reduce high-risk sexual contacts and to increase low-risk activities; and seeking and enacting of solutions directed at reducing high HIV risk behaviour.

PMT introduces the element of fear and proposes that one's intention to engage in health protective behaviour depends upon four perceptions: perceived severity of a disease; perceived probability of the occurrence, or vulnerability to a disease; efficacy of the recommended preventive behaviour (perceived response efficacy); and perceived self-efficacy.

Use of two ILTs in one study, in  
*full* form.  
 $k = 3$

PMT and TPB.

IBM and I-Change model (ICM: De Vries et al., 2005).

The ICM is similar to the TPB in the way it conceptualizes attitudes, subjective norms, and self-efficacy (i.e., their influence on behaviour is expected to be mediated by intentions to act). In addition, the ICM states that skills and the removal of environmental barriers are important prerequisites for intentions to be translated into behaviour,

Boer & Mashamba (2005); Boer & Mashamba (2007).  
Eggers et al. (2014).

and that knowledge and risk perception have direct links to attitudes, subjective norms and self-efficacy formation.

Use of a single variable drawn from (or associated with) the included ILTs.  
 $k = 1$

Control perceptions/self-efficacy.

Asante et al. (2015).

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*Note.* <sup>a</sup>Frequency denotes the number of studies in which the theory appears in the studies included in the present review.

<sup>b</sup>Study identified in the scoping review that tested the theory in its entirety, or included the identified social-cognitive construct as a predictor of condom use, in sub-Saharan African young people. Full references of studies included in the review are listed in Appendix A as online supplemental material.

Table 3

*Categorization Matrix: Categories and Frequency and Prominence of Socio-Ecological Constructs Linked to Condom Use*

Relational constructs (prominence = 44)	Individual-differences constructs (prominence = 34)	Societal /structural constructs (prominence = 16)	Community and peer constructs (prominence = 1)
Being male (11)	Older age at data collection (9)	With low or no religion/religiosity (5)	Empowerment (e.g., involvement participatory health promotion programs in and out of school environment) (1)
Past condom use (11)	Younger age at data collection (7)	No environmental barriers to condoms (e.g., easily accessed; freely and cheaply obtained; no embarrassment) (4)	
Being single/ dating casually (8)	Higher HIV-related knowledge (5)	Higher SES (3)	
Effective communication and negotiation with sexual partner (5)	Older age at first sex (3)	Higher educational level (2)	
Being female (5)	Low value placed on hedonistic/ pleasure aspects of sex (3)	Higher HIV-related stigma (2)	
No experience of forced sex or sexual violence (2)	Rare or no alcohol use before/during sex (3)	With high religion/religiosity (2)	
Being in a committed relationship (1)	Positive outlook/optimism (2)		
Use of other contraception (1)	Acceptance of sex and sexuality (2)		

*Note.* Numbers in parentheses indicate the frequency with which a construct appears in the studies included in the review. Prominence is gauged by co-occurrence, i.e., the number of times a construct appears across studies. Construct categories adapted from DiClemente, Salazar, Crosby, and Rosenthal (2005).

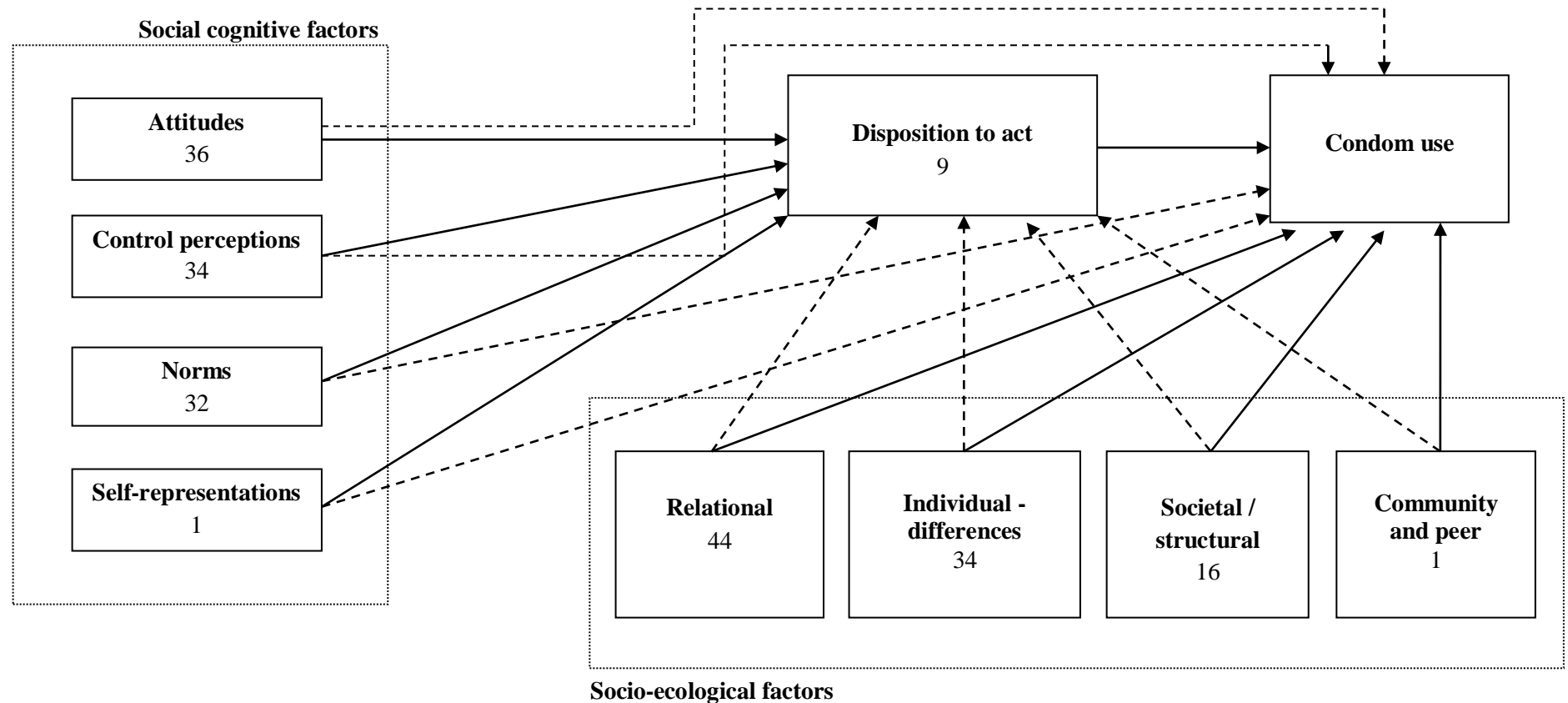


Figure 1. The integrated theoretical model of condom use in young people in sub-Saharan Africa. Numbers indicate construct prominence/co-occurrence of the construct, i.e., the number of times a construct related to condom use appears across studies included in the review. Broken lines from social cognitive factors to condom use indicate pathways hypothesized to be mediated by disposition to act. Broken lines from socio-ecological factors to disposition to act represent instances in which effects of these factors on condom use are mediated by disposition to act. These reflect dual routes to behaviour with the direct effects likely to most prominent, independent of the decision-making process in the model, but the mediated paths remain potential pathways to behaviour when the socio-ecological constructs serve as a basis for making decisions.