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Community Based HIV Prevention Interventions In Africa: A Systematic Review

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COMMUNITY BASED HIV PREVENTION INTERVENTIONS IN AFRICA:
A SYSTEMATIC REVIEW

by

Sarah Ibrahim

B.ScN, Ryerson University, Canada, 2010

A thesis

presented to Ryerson University

in partial fulfillment of the

requirements for the degree of

Master of Nursing

in the Program of Nursing

Toronto, Ontario, Canada, 2012

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AUTHOR'S DECLARATION

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COMMUNITY BASED HIV PREVENTION INTERVENTIONS IN AFRICA: A
SYSTEMATIC REVIEW

ABSTRACT

by

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Master of Nursing

Ryerson University, Toronto, 2012

This systematic review is the first to examine the characteristics of community-based HIV prevention interventions, specifically the theoretical underpinning, type and number of components, dose, mode of delivery, and teaching method; and explore the effects of the intervention characteristics on HIV-related knowledge and engagement in risk behaviour among young persons in Africa. A total of 5 studies were included in this review. Conceptual and operational definitions of the intervention characteristics guided the coding and extraction of data from the reports. The overall results of this study showed variability in theoretical underpinning, dose, and mode of delivery of interventions. Multi-component interventions using mixed teaching method produced the desired effect on knowledge and risk behaviour. The examination of community based HIV prevention intervention characteristics provides direction for the development of efficient future interventions to decrease the transmission of HIV among young persons in Africa.

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BACKGROUND

Acquired Immunodeficiency Syndrome (AIDS) is defined as “symptoms, infections and cancers associated with the deficiency of the immune system,” which stem from the Human Immunodeficiency Virus (HIV) (UNAIDS, 2008, p. 2). HIV is a class of viruses that infect and destroy lymphocytes or white blood cells, which lead to a progressive impairment and deterioration of the immune system (UNAIDS, 2008;WHO, 2010). The mode of HIV transmission is through unprotected sexual intercourse, the transfusion of contaminated blood, the sharing of needles and syringes, as well as between mothers and infants during pregnancy, childbirth and breastfeeding (WHO, 2010).

To date, 33.4 million individuals have been infected with HIV worldwide (WHO, 2010). The epidemic has claimed 25 million lives worldwide (UNAIDS, 2009), with a mortality rate of 2 million lives per year (WHO, 2010). Young persons between the ages of 15 and 24 years are significantly impacted by the epidemic as it is estimated between 6,000 and 7,000 become infected each day (UNAIDS, 2010) and 95% of individuals infected with HIV reside in developing countries (Ministry of Health Viet Nam, 2010). Furthermore, it is estimated that in various regions of Africa, 75% of persons living with HIV are between the ages of 15 and 24 years (Quinn & Overbaugh, 2005).

The HIV epidemic has had a significant impact on healthcare system, morbidity and mortality rates, and school enrolment rates across the continent of Africa (UNAIDS, 2010). HIV prevalence rates range between 2% and 5.2% in West and Central Africa (UNAIDS, 2010). This accounts for 60,000 to 3.3 million individuals in this region, which is considerably low in comparison to South and East Africa (UNAIDS, 2010). South and East Africa are more affected

by the epidemic, with Sub-Saharan Africa being most impacted (UNAIDS, 2010). The total number of individuals living with HIV in Sub Saharan Africa is estimated to be two thirds (68%) of 22.5 million worldwide. The individuals most at risk of contracting HIV are young men and women between the ages of 15 and 24 years (UNAIDS 2010).

Gender has significant implications on a young person's level of risk and vulnerability for contracting HIV (McCoy, Kangwende & Padian, 2010; Turmen, 2003; WHO, 2003). As a social construct, gender differentiates roles, responsibilities, decision making ability, access, and power from men and women (WHO, 2003). These gender differences create inequality and power imbalance between men and women, and in turn increases individuals' vulnerability to contracting HIV, access to preventative resources, tools, and support (WHO, 2003).

Young men between the ages of 15 and 24 years constitute one-quarter of persons living with HIV in Africa (UNAIDS, 2001). These individuals are likely to engage in risk behaviours such as unprotected sexual intercourse and have multiple sexual partners (UNAIDS, 2001).

Young women between the ages of 15 and 24 years are at an increased risk of contracting HIV (UNICEF, 2003). During vaginal intercourse immature female vaginal tracts are likely to tear, increasing the risk of contracting a sexually transmitted infection (STI) or HIV (UNAIDS, 2010; UNICEF, 2003). As well, throughout Africa women of all ages are oppressed, lack power, have lower socioeconomic status, and are more dependent on men (Gupta, 2002; Turmen, 2003). Women are at increased risk of contracting HIV due to: loss of control within sexual interactions and inability to be assertive and negotiate safe sexual practices (e.g. use of condoms) (Gupta, 2002; Turmen, 2003). Young women and men tend to lack sexual health education on reproductive system, pregnancy, and STIs; they often receive unreliable and inaccurate information leading to higher risk of contracting HIV (UNAIDS, 2001).

As compared to young men, young women are at a higher risk of contracting HIV because of social factors such as their social position, poverty, lack of education, and violence, power imbalance and gender inequality. These social factors influence their health-related outcomes, engagement in health sexual behaviour and access to HIV prevention information (McCoy et al., 2010; Turmen, 2003; WHO, 2008).

The HIV epidemic has significantly influenced the health care system in Africa (UNAIDS, 2006). In particular, it has led to an increase in the number of hospitalizations, extended length of hospital stay, and has created depletion in hospital supplies and medication (WHO, 2006). In addition, the increasing numbers of individuals diagnosed with HIV has simultaneously resulted in a rise in both morbidity and mortality rates. Furthermore, the increasing rates of HIV and associated morbidity have led to a decrease in school enrolment rates among men and women between the ages of 15 and 24 years.

There is no cure for AIDS (United Nation, n.d). Therefore, current management involves Antiretroviral Therapy (ART) which is used to suppress the progression of HIV to AIDS (WHO, 2010) and an emphasis on the prevention of HIV through educational initiatives that focus on strategies and behaviours that reduce the risk of contracting the HIV virus (United Nations, n.d.).

As a result of the increasing spread of HIV in Africa, the burden it continues to place on the region's healthcare system and the significant increase in morbidity and mortality rates, various educational initiatives have been used in an effort to decrease the rate of infection, particularly among individuals between the ages of 15 and 24 years. These initiatives focus on enhancing HIV-related knowledge and providing various behavioural strategies to reduce the rate of HIV transmission (Coates et al., 2008; UNAIDS, 2009).

The educational programs targeting young persons have been designed and implemented around the world, including Africa, and have been offered in two settings: school and community (Gallant & Maticka-Tyndale, 2004; Kinsler, Sneed, Morisky & Ang, 2004; Kinsman, Harrison, Kengeya-Gayondo, Kanyesigye, Musoke & Whitworth, 1999). The objectives of these programs are the same; that is, to increase HIV-related knowledge and decrease the engagement in sexual risk behaviours; however the target population and the process related to how the program is delivered differ for the two settings (Agha & Van Rossem, 2004; Cowan et al., 2008; Gallant & Maticka-Tyndale, 2004; Kinsler et al., 2004; Maro et al., 2009; Pettifer et al., 2005; Ross et al., 2007).

School and community based education programs have been designed and delivered as part of HIV prevention initiatives. School based programs are delivered to individuals between the ages of 12 to 14 years enrolled in primary schools because they are approaching the age of first sexual intercourse and activity, with heightened risk for contracting HIV (Clark et al., 2006). However this category of educational initiative has not been successful in reducing the spread of HIV in different regions of Africa for several reasons. The reasons are: pre-existing curriculum overload (Clark et al., 2006); and small number of students enrolled in formal education programs. Also, the school-based programs reach only a small percentage of the target population.

Community based HIV prevention programs represent the second category of educational initiatives that have been frequently implemented across Africa. These programs are delivered to communities with high prevalence of HIV (Campbell, Nair & Maimane, 2007; Ellen et al., 2010). Communities share common culture, traditions, history, geographic location, resources, and identity (Ellen et al., 2010). The goals of these community based programs are to motivate

individuals to learn and to empower them to engage in HIV prevention strategies (Cowan et al., 2008; Hayes et al., 2005; Erulkar et al., 2004; Maro et al., 2009; Pettifer et al., 2005; Ross et al., 2007; Stadler et al., 2002). Although community based HIV prevention programs have been implemented to address the epidemic in Africa, the evidence of their overall effectiveness is not well established (Ross, Dick & Ferguson, 2006).

Problem statement

Community based prevention programs or interventions provide individuals between the ages of 15 and 24 years with HIV prevention education (Maro et al., 2009). They are offered in community settings, where individuals are prone to spend a large proportion of their time (Maro et al., 2009). Community based interventions implemented in Africa allows for the provision of HIV prevention education in informal settings, addressing concerns raised regarding provision of sexual health education in classrooms (Clark et al., 2006). These interventions however, have not been consistently designed. There are reports of variations related to the theoretical underpinning (e.g. social learning theory), components (e.g. educational, behavioural), dose (one to twelve sessions) (Noar, 2008), mode of delivery (e.g. one-on-one, group session, or mixed), and teaching method (e.g. interactive through sports or didactic through structured presentation, or written material) of the interventions. Variations in the delivery of interventions may result in inconsistent findings related to their effectiveness. It is important to identify the most effective characteristics of interventions in order to design efficient (Fan & Sidani, 2009) and effective HIV community based prevention interventions. Delivering an HIV prevention intervention that is designed to enhance knowledge of HIV prevention strategies and to change at risk behaviours is imperative in decreasing the spread of HIV among young individuals between the ages of 15 and 24 years in local communities. There have been systematic reviews on school-based HIV

prevention interventions (e.g. Gallant & Maticka-Tyndale, 2004; Kinsman et al., 1999) and on community-based HIV prevention interventions that have been implemented in developing countries (e.g. Maticka-Tyndale & Brouillard- Colye, 2006) for the prevention of HIV. In addition, a meta-analysis was conducted to examine the effects of prevention interventions on reducing engagement in risk behaviour among persons living with HIV (Crepaz et al., 2006). However, these reviews did not specifically focus on community-based HIV prevention interventions that were delivered to young persons living in Africa, where the HIV epidemic has had the most impact. Further, these reviews did not clearly examine the contribution of intervention characteristics to the outcomes, particularly in the context of Africa. Identifying which intervention characteristic contributes most to the outcomes is useful in designing the most efficient and effective HIV prevention interventions. This systematic review described the characteristics of community based HIV prevention interventions delivered in Africa and examined their effectiveness in enhancing knowledge and in reducing engagement in at risk behaviours.

Study Purpose

The purpose of the systematic review were twofold: 1) to examine the characteristics of community based interventions implemented in Africa, specifically the theoretical underpinning, type and number of components, dose, mode of delivery and teaching method, and 2) to explore the effect of these characteristics in enhancing knowledge of HIV prevention and engagement in HIV prevention behaviours among young persons between the ages of 15 and 24 years in Africa.

Significance of Problem

The examination of the characteristics of community-based HIV prevention interventions implemented in Africa allows for the identification of the intervention characteristics that are most effective in enhancing knowledge of HIV prevention and engagement in prevention behaviour. This will provide direction for the development of effective and efficient HIV prevention interventions to decrease the transmission of HIV among young males and females between the ages of 15 and 24 years of age in Africa.

CONCEPTUAL FRAMEWORK

The development and implementation of health interventions are a means of responding to an identified problem; the interventions are intended to prevent or manage the problem (Sidani & Braden, 2011). According to Sidani and Braden (1998), interventions refer to “procedures, treatments, or actions that are implemented by health professionals to and in collaboration with clients to achieve the desired outcomes” (p. 108). Interventions vary in their characteristics including the theoretical underpinning, type and number of components, dose, and mode of delivery. Such variability may influence the integrity of the intervention implementation and consequently the achievement of outcomes (Sidani & Braden, 2011). The problem of interest in this systematic review relates to inadequate knowledge and engagement in health sexual behaviours among young persons residing in Africa, which increases their risk of engaging in risk behaviour and in turn, contracting HIV. The interventions under investigation are those comprised of educational and behavioural components given in community settings with the goal of enhancing young persons’ knowledge and engagement in health sexual behaviours. Successfully addressing the lack of knowledge and risk behaviours will contribute to the containment of the HIV epidemic in Africa.

This chapter provides conceptual and operational definitions of the intervention characteristics and the outcomes of interest.

Characteristics of Interventions

The characteristics of community HIV prevention interventions which were investigated in this study included: (1) theoretical underpinning; (2) type and number of component(s); (3) dose; (4) mode of delivery; and (5) teaching method. The definitions of the characteristics were

derived from the work of Sidani and Braden (2011) and Fan and Sidani (2009), and were consistent with those used in other reviews (e.g. Blue and Black, 2005; Fredericks, Guruge, Sidani and Wan, 2010).

1. Theoretical Underpinning

Theory “describes, explains and predicts phenomena in nature and provides an understanding of the relationship between phenomena” (McEwen & Wills, 2011, p. 7). In intervention research, theoretical underpinning refers to the theory underlying the intervention. The intervention theory identifies the problem addressed by the intervention and its determinants, and specifies the aspect(s) of the problem or its determinants that are amenable to change and are to be targeted by the intervention. In addition, the intervention theory describes the components and activities of which the intervention should be comprised to address the selected aspect(s) of the problem. It also delineates the outcomes expected of the intervention (Sidani & Braden, 2011).

The most common theories underlying the design of HIV prevention interventions were identified in this study. This entailed determining: 1) whether or not a theory was identified as guiding the design of the intervention and 2) the specific theory used.

2. Type and Number of Components

An intervention component refers to a “set of interrelated activities aimed at addressing a common objective” (Sidani & Braden, 1998, p. 110). Examples of component include: educational component focused on relaying information on HIV and its impact on health, and behavioural component focused on enhancing skills required to reduce engagement in risk behaviour. Community HIV prevention interventions could be comprised of one or more

components. Previous studies did not specifically evaluate the effectiveness of individual components of community HIV prevention interventions; rather, the evaluation examined the effects of the whole interventions regardless of their constituting components. However, there is evidence indicating multi-component interventions were more effective than single component interventions (Beyth, Quinn & Landefeld, 2000; Blue & Black, 2005; Crepaz et al., 2006; Milisen, Lemiengre, Braes & Foreman, 2005; Van Sluijs, McMinn & Griffin, 2007). This highlighted the importance of identifying which components or combination of components of which community HIV prevention interventions were comprised, were frequently used and found effective in achieving beneficial outcomes.

Components of community based HIV prevention interventions included educational, behavioural, and combination. An educational component focused on provision of information that addressed methods of HIV transmission and prevention to reduce the risk of contracting HIV; the aim is to improve knowledge of HIV and its prevention. A behavioural component targets risk behaviours, with the goal of decreasing engagement in risk behaviours (e.g. decreasing number of sexual partners), and promoting protection during sexual intercourse (e.g. use of contraceptive). A combined component or multi-component intervention entailed the integration of both educational and behavioural components.

3. Dose

Dose is the “level at which the intervention is delivered” to generate the expected changes in the outcomes (Sidani & Braden, 2011, p. 59). There is limited research on the effectiveness of different dose levels of community HIV prevention interventions. However, variability in dose may lead to variability in outcome achievement, as empirical evidence has indicated interventions with a large number of sessions and/or long duration yielded large effect

size for the respective outcomes (Agurs-Collins, Kumanyika, Ten Have & Adams-Campbell, 1997; Brown, 1992; Crepaz et al., 2006; Fan & Sidani, 2009; Gallant & Maticka-Tyndale, 2004; Wingwood et al., 2004).

The dose of a community based HIV prevention intervention was operationalized in terms of three dimensions: amount, frequency, and duration (Sidani & Braden, 2011). Amount referred to the length of each session (e.g. total amount of time). Frequency referred to the number of times the sessions were given over a specified period of time (e.g. once a week or month). Duration referred to the total time period over which sessions were delivered.

4. Mode of Delivery

Mode of delivery referred to the technique used to provide the intervention to the target population, encompassing strategy and format. Strategy referred to the method used to convey information such as brochures, pamphlets, and media; communication through face-to-face interactions; or a combination of strategies (Fan & Sidani, 2009). Format referred to the type of session such as one-on-one, group, or a mix of individual and group sessions (Fan & Sidani, 2009, p.19).

5. Teaching Method

Teaching method was categorized into: 1) didactic, which was characterized by limited interaction and discussions between the interventionist and participants. Didactic teaching methods involved conveying HIV-related information through distributing written material, or formal presentations given by the interventionist; 2) interactive, which entailed active involvement of the participants throughout the learning process (such as group discussion or

hands-on-practice); and 3) mixed, which encompassed a combination of didactic and interactive approaches (Fan & Sidani, 2009).

Outcomes

Community based HIV prevention interventions are expected to contribute to the containment of the HIV epidemic through the following mechanism: increased HIV related knowledge specific to prevention, transmission, and risk factors; increased knowledge supports the performance of health sexual behaviours and decreases engagement in risk behaviours among young persons (Odu & Akanle, 2008; WHO, 2011). The latter in turn, minimizes HIV transmission. Knowledge and risk behaviour were the outcomes of interest in this systematic review and are defined in the following section.

Knowledge

Knowledge is defined as information about a topic which consists of “facts, ideas, theories, principles, models, and framework” (Barclay & Murray, 1997, p. 2). Knowledge was conceptualized as a positive pre-requisite for promoting health as it assists individuals in taking action towards engagement in health sexual behaviours and decreases the performance of risk behaviours (Khachkalyan, Soghikian & Petrosyan, 2003). For the purpose of this study, knowledge was operationally defined as young persons’ ability to: define HIV, identify methods of HIV transmission and identify protective approaches and behaviour to decrease risk of contracting HIV (Maimaiti et al., 2010).

Risk Behaviour

Risk behaviour referred to engagement in a specific action that can lead to adverse effects (McKie et al., 1993). Risk behaviours have adverse effects on the well being and development of

youth (Guzman & Bosch, 2007) as their impact ranges from immediate (such as fever-like illnesses, joint pain, enlarged lymph nodes) (UNAIDS, 2008) to long term consequences (such as AIDS) (McKie et al., 1993; UNAIDS, 2008). In this study, risk behaviour was operationalized as not using condoms during sexual intercourse with one or more sexual partners (Cowan et al., 2008; Maro et al., 2000; Pettifor et al., 2005; Ross et al., 2002; Taylor et al., 2011).

METHODOLOGY

This chapter summarizes the design, study selection criteria, and strategies used to search the literature. The methods for data extraction and analysis are described.

Overview of Study Design

A descriptive systematic review of HIV community based prevention interventions implemented in Africa was undertaken to examine the characteristics of the interventions and explore the effect of these characteristics on enhancing HIV-related knowledge and reducing performance of risk behavior. Two methods were used to guide the synthesis of the studies' findings. The first was "vote-counting," which consisted of determining the number of studies showing beneficial outcomes relative to the intervention characteristics (Cooper, 1998). The second involved estimation of the effect size, where available. The effect size reflects the magnitude of the relationship between the intervention characteristics and the outcome (Burns & Grove, 2009).

Overview of Selection Criteria

To address the study purposes, studies were included in the systematic review if they met the following criteria:

1. Type of studies:

Study reports published in English; use of experimental and quasi-experimental designs involving two groups (experimental and comparison).

2. Type of targeted participants:

Target population consisting of persons between the ages of 15 and 24 years living in Africa.

3. Types of intervention:

Studies that evaluated community based HIV prevention interventions implemented in Africa. Community based HIV prevention interventions were delivered in the community setting where young persons spend a large portion of their time (Maro et al., 2009).

4. Types of outcomes measured:

Studies that evaluated the effects of HIV prevention intervention on: HIV-related knowledge and risk behaviour.

Search strategy for identification of studies

A literature search was conducted to identify studies that evaluated community based HIV prevention interventions. The electronic databases searched to identify studies based on the inclusion criteria were: Cumulative Index to Nursing and Allied Health Literature (CINAHL), Educational Research Information Clearinghouse (ERIC), Medline/PUBMED (National Library of Medicine), EBSCO, and Social Science Citation Index. The keywords used in the search for each database were: HIV interventions, HIV prevention, community, education, knowledge, risk behavior, condom use, young persons, and Africa. In addition, Boolean operators were used to refine the search and combine terms (e.g. HIV prevention and community based intervention) within the citations were used to streamline the search in the database records. A supplemental search was also conducted by examining the reference lists from the retrieved studies. A total of 11 articles were retrieved from the searches, and of these, 8 articles met the selection criteria.

Method of Data Extraction

Data were extracted on study characteristics, community prevention intervention characteristics and outcomes of interest assessed at post-test. Guided by the operational definitions presented in Chapter 2, a coding scheme was developed to facilitate extraction of relevant data from each article. The following sections provide details regarding the coding scheme for the systematic review.

Study Characteristics

The following information related to study characteristics were extracted from each article: (a) author's last name (s) and year published; (b) study setting (e.g. specific country within Africa); (c) environment in which intervention was delivered (e.g., church, community clinic, community center); and (d) characteristics of the sample including age (mean and range), gender (percentage of women and men), and level of education.

Characteristics of Intervention

Data were extracted related to the following intervention characteristics:

1. Theoretical Underpinning

Theoretical underpinning was categorized as whether or not a theory was used to guide the design of the intervention (0 = no, 1 = yes). The specific theory used was also identified (e.g. Theory of Planned Behaviour, Social Cognitive Theory).

2. Type and Number of Component

The type and number of components were identified from the description of the intervention. Type of component was categorized as educational (relaying information about

HIV and methods of transmission and prevention); behavioural (emphasizing change in sexual risk behaviours); or combined involving educational and behavioural components. The type of components are coded as 1=educational; 2=behavioural; 3= combined. Number of component was counted and reported.

3. Dose

Dose was operationalized by amount, frequency, and duration. Amount referred to the length of each session; the total number of minutes was counted for each session delivered. Frequency was represented by number of times the sessions were given over a week as reported in the selected articles. Duration was quantified by the total time period over which sessions were delivered.

4. Mode of Delivery

Mode of delivery was operationalized by strategy and format. Strategy was categorized into: 1) written material, which included distribution of pamphlets, brochures, booklets, or handouts covering HIV-related information); 2) media that is, use of television, radio to transfer HIV related information; 3) face-to-face, involving direct contact with participants; and 4) mixed, referring to a combination of written material, media, and face-to-face approach.

Format was classified into: 1) one-on-one delivery of the intervention, which involved individual interaction between one participant and the interventionist ; 2) group delivery of the intervention entailed several persons attending the session; or 3) mixed delivery of the intervention including a combination of both individual one-on-one and group interactions.

5. Teaching Method

Teaching method encompassed: 1) didactic teaching method, which referred to conveying HIV-related information to participants through the distribution of written material or through attending formal sessions delivered by the interventionist and characterized by limited discussion between participants and interventionist (Fan & Sidani, 2009); 2) interactive teaching method, included group discussions, sport recreational activities, role-playing, story-telling, body mapping, drama skits, and board games; or 3) mixed teaching method referred to the integration of didactic and interactive teaching methods.

Overview of Outcome Characteristics

The outcomes of interest were knowledge and risk behaviour. These outcomes were commonly assessed by self-report measures. For each outcome, the reported mean and standard deviation values were extracted for the experimental and comparison groups at post-test. In addition, data were extracted on the presence of statistically significant difference in the outcome between the groups at post-test, which was coded as 0=not significant and 1=statistically significant.

Data on outcome measurement identified: (1) the type of measure used; and (2) whether the reliability of the measure was reported (coded as 0=no; 1=yes).

Data Analysis

Descriptive statistics were used to characterize the studies and address the first objective of the systematic review. Specifically, measures of central tendency were used to describe the characteristics of the interventions and of the outcomes. Further, the number of studies reporting significant intervention effects on each outcome and the effect size were reported.

To address the second objective that is, to explore the effect of the intervention characteristics on HIV- related knowledge and engagement in risk behaviour, Cooper's (1998) "vote counting" procedure was used. According to this procedure, studies were divided into three categories: (1) studies with significant results in the hypothesized direction (e.g. improvement in outcomes observed in the experimental group); (2) studies with significant results in the direction opposite to hypothesized (e.g. improvement in outcomes observed in the comparison group); and (3) studies with non-significant results (n.s.) (Cooper, Hedges & Valentine, 2009). The category that contained the most studies indicated whether or not the interventions were effective in enhancing HIV-related knowledge and decreasing engagement in risk behaviour. Further, the categories of findings were related to the study characteristics, using chi-square test where applicable.

Inter-rater reliability

The researcher extracted and collected the data from all articles that met the inclusion criteria. In order to demonstrate consistency of the data extracted, inter-rater reliability is warranted (Burns & Grove, 2009). The researcher provided the second-rater with written instructions and procedures used for the data collection process and tables of the data extraction on study characteristics, participant characteristics, intervention characteristics, and outcomes of interest. The second-rater independently reviewed and extracted data on three randomly selected articles. A commonly acceptable value of 0.80 or greater was deemed as an appropriate value for the inter-rater reliability (Burns, & Grove, 2009). The second-rater was able to extract the same data as the researcher on study characteristics, participant characteristics, intervention characteristics, and outcomes of interest, yielding a 100% agreement between raters.

RESULTS

This chapter presents the findings of the systematic review that examined the characteristics of HIV-prevention interventions and the effects of these characteristics on knowledge and risk behaviour among young persons in Africa.

Profile of Studies

A total of 8 articles were found that met the inclusion criteria. Two articles were duplicates addressing the same intervention; therefore one was selected for study inclusion. Of the remaining 7 articles, two reported on pre-test measures, while two reported on post-test measures for two interventions. These two articles represented data pertaining to the evaluation of two interventions. The remaining articles reported on the evaluation of three different interventions and were included in the review. As a result, a total of five studies that presented pre-test and post-test outcome data obtained from the evaluation of five interventions were included in the systematic review. Investigators in four studies (80%) assessed the effects of the intervention on knowledge and risk behaviour (Cowan et al., 2010; Maro, Roberts & Sorensen, 2009; Pettifor et al., 2005; Ross et al., 2007); the investigators of one (20%) study (Erulkar, Ettyang, Onoka, Nyagah, & Muyonga, 2004) reported on only risk behaviour outcomes.

Study Characteristics

The five studies were published between 2002 and 2010 and were conducted in Tanzania (n=2, 40%), Zimbabwe (n=1, 20%), South Africa (n=1, 20%) and Kenya (n=1, 20%). The majority (n=4, 80%) of studies used a quasi-experimental design (Cowan et al., 2010; Erulkar et al., 2004; Maro et al., 2009; Pettifor et al., 2005), while one (20%) study used an experimental

design (Ross et al., 2007). The location for the delivery of HIV-prevention intervention was identified in all studies. In some studies the intervention sessions were given in different locations. Specifically, the location included community clinics (Cowan et al., 2010; Pettifor et al., 2005; Ross et al., 2007), community centres (Cowan et al., 2010; Pettifor et al., 2005), in-school (Cowan et al., 2010; Erulkar et al., 2004; Maro et al., 2009; Pettifor et al., 2005; Ross et al., 2007), out of school (Cowan et al., 2010; Maro et al., 2009; Ross et al., 2007), churches (Erulkar et al., 2004), and sport clubs (Erulkar et al., 2004).

Characteristics of Participants

Sample sizes ranged from 684 (Cowan et al., 2008) to 9, 219 (Ross et al., 2007) participants. The mean age of participants across all five studies varied between 13.5 and 20 years of age. The interventions were delivered to young males and young females. Four studies (80%) (Cowan et al., 2008; Erulker et al., 2004; Maro et al., 2007; Ross et al., 2007) reported data on participants' level of education; the number of years of formal education ranged from 0 to 9 years.

Description of Intervention Characteristics

The following section describes the characteristics of the community based HIV-prevention interventions evaluated in the selected studies. The studies did not report enough information to calculate effect size and as a result, the effect size was not calculated in this review. These are summarized in Table 1.

Table 1
Intervention Characteristics

Intervention Characteristics	Number of studies reporting	Main Findings
Theoretical Underpinning	3	Used theory (n=2) Not used theory (n=3)
Type and Number of Component	5	Used multi-component (n=5)
Dose		
Amount	3	Amount range: 40 minutes to 180 minutes
Frequency	3	Frequency range: 1 session per week, 2-12 sessions per year, and 6 sessions per week to 22 sessions per year
Duration	4	Duration range: 8 weeks to 208 weeks
Mode of Delivery		
Strategy	5	Mixed strategy (n=2) Face-to-face strategy (n=3)
Format	5	Group format (n=2) Mixed format (n=3)
Teaching Method	5	Mixed teaching method (n=5)

Theoretical Underpinning

As shown in Table 1, three (60%) of the five studies did not report using a theory to guide the development of the intervention (Erulkar et al., 2004; Pettifor et al., 2005; Ross et al., 2007) and two studies (40%) did (Cowan et al., 2010; Maro et al., 2009). One study (Maro et al., 2009) used the Achievement Goal Theory and elements of the Social Cognitive theory, whereas one study (Cowan et al., 2010) used a combination of Social Learning Theory and Stages of Change Model.

Type and Number of Component

Across the five studies, the interventions consisted of two components. These entailed combination of educational and behavioural components as illustrated in Tables 1 and 2.

Dose

As shown in Table 1, only three (60%) studies (Cowan et al., 2008; Erulkar et al., 2004; Ross et al., 2007) reported on length of the sessions delivered (amount), which ranged from 40 minutes (Ross et al., 2007) to 180 minutes (Cowan et al., 2008). Three of the five studies (Cowan et al., 2009; Erulkar et al., 2004; Ross et al., 2007) reported on the frequency of providing the sessions. The frequency of the sessions was described as: 1 session per week (Erulkar et al., 2004), 2-12 sessions per year (Ross et al., 2007), and 6 sessions per week to 22 sessions per year (Cowan et al., 2008). The duration of the intervention was reported in four studies (Cowan et al., 2010; Erulkar et al., 2004; Maro et al., 2009; Ross et al., 2007). It ranged from 8 weeks (Maro et al., 2009) to 208 weeks (4 years) (Cowan et al., 2010).

Mode of Delivery

Two (40%) studies (Pettifor et al., 2005; Ross et al., 2007) used a mix of strategies for intervention delivery. Mixed strategy included a combination of written material (Pettifor et al., 2005); media outlets (Pettifor et al., 2005; Ross et al., 2007); and face-to-face format (Pettifor et al., 2005; Ross et al., 2007). In three studies (60%) (Cowan et al., 2010; Erulkar et al., 2004; Maro et al., 2009) a face-to-face mode was applied to deliver the intervention.

As shown in Tables 1 and 2, the format for intervention delivery was group in two intervention studies (40%) (Erulkar et al., 2004; Maro et al., 2009) and mixed in three studies (60%) (Cowan et al., 2010; Pettifor et al., 2005; Ross et al., 2007). The mixed format included a combination of one-on-one and group interactions.

Teaching Method

The five studies applied mixed teaching methods for providing the intervention (Tables 1 and 2). The educational component included the relay of HIV-related information through lectures in four (80%) studies (Cowan et al., 2010; Erulkar et al., 2004; Maro et al., 2009; Ross et al., 2007) and print materials in one study (Pettifor et al., 2005). Different teaching methods were applied in the behavioural components; these included: video (Ross et al., 2007), television and radio (Pettifor et al., 2005), drama (Cowan et al., 2010; Erulkar et al., 2004; Ross et al., 2007), story-telling (Cowan et al., 2010; Ross et al., 2007), role-playing (Cowan et al., 2010; Erulkar et al., 2004; Ross et al., 2007), games (Pettifor et al., 2005; Ross et al., 2007), recreational activities such as soccer (Maro et al., 2009; Pettifor et al., 2005; Ross et al., 2007), and body-mapping (Cowan et al., 2010).

Table 2
Overview of Intervention Characteristics

Study	Study Method	Theoretical Underpinning	Type & Number of Components	Dose	Mode of Delivery	Teaching Method
Ross et al. 2007 and Hayes et al. 2005 *	Community randomized trial	Not Reported	Educational Behavioural	Amount: 40 min. Frequency: 2/year; 12/year Duration: 3 years	Strategy: Face-to-face Media Format: One-on-one Group	Didactic: lessons on sexual health Interactive: drama, story-telling, role-play, games, exercise
Maro et al. 2009	Quasi-experimental	Achievement Goal Theory	Educational Behavioural	Amount: NR Frequency: NR Duration: 8 weeks	Strategy: Face-to-face Format: Group	Didactic: Education sessions Interactive: Soccer
Pettifer et al. 2005 and Stadler et al., 2002*	Quasi-experimental	Not Reported	Educational Behavioural	Amount: NR Frequency: NR Duration: NR	Strategy Written Media Face-to-face Format: One-on-one (clinic services) Group	Didactic: Print & prevention information Interactive: Recreational activities (e.g. sports)
Cowan et al., 2008 and Cowan et al. 2010 *	Quasi-experimental	Social Learning theory & Stages of Changed model	Educational Behavioural	Amount: 3 hours (180 min) Frequency: 6/week-22/year Duration: 4 years (208 weeks)	Strategy: Face-to-face Format One-on-one (clinics) Group	Didactic: in & out of school curriculum Interactive: body mapping, drama, story-telling, role-play & group sessions
Erulkar et al 2004	Quasi-experimental	Not Reported	Educational Behavioural	Amount: 90-120 min. Frequency: 1/week Duration: 36 months	Strategy: Face-to-face Format: Group	Didactic: Lectures Interactive: group discussion Drama Role-play

* Multiple report of same study

Overview of effectiveness of HIV-prevention intervention

The following section provides an overview of the overall effectiveness of the HIV-prevention interventions on knowledge and risk behaviour.

Four studies evaluated the outcome of knowledge. Overall, the interventions were effective in achieving the desired knowledge outcome. Specifically, in most studies (n=3, 75%) (Maro et al, 2009; Pettifor et al, 2005; Ross et al 2007) the effects of the intervention on knowledge were statistically significant. However in one study (25%) (Cowan et al., 2008), no statistically significant difference in knowledge was noted between the control and experimental group.

Five studies reported on risk behaviour outcomes. Three (60%) reported statistically significant differences in risk behaviours (Erulkar et al, 2004; Maro et al, 2009; Pettifor et al 2005) between the control and the experimental groups. However, the results of one study (20%) (Ross et al, 2007) showed statistically significant intervention effects on risk behaviour in young males but not in young females. One study (Cowan et al 2008) reported no statistically significant effects of the intervention on risk behaviour.

Influence of Intervention Characteristics on Outcome

The following section presents the findings related to the influence of HIV-prevention intervention characteristics on the outcomes of knowledge and risk behaviours.

Theoretical Underpinning

Of the four studies which reported on knowledge, two (50%) (Pettifor et al., 2005; Ross et al, 2007) did not use a theory to guide the design of the intervention but reported statistically significant differences in knowledge between the control and the experimental groups at post-

test. Of the two studies which used theory to guide the design of the intervention, one did not (25%) (Cowan et al., 2008) (Adjusted Odds Ratio (AOR): 1.09-1.16) and one did (Maro et al., 2009) report statistically significant effects on knowledge.

Of the five intervention studies which reported on risk behaviour, two (40%) (Erulkar et al., 2004; Pettifor et al., 2005) that did not have theoretical underpinnings, found statistically significant intervention effects on this outcome. Erulkar et al. (2004) reported an increase in use of condoms during sexual intercourse (22%-39% vs. 32%-45%) and a decrease in number of sexual partners (14%-29% vs. 5%-24%). Pettifor et al. (2005) found that 78% of participants used a condom when engaging in sexual intercourse and 69% decreased the number of sexual partners. The one study (20%) (Ross et al., 2007) that did not use a theory to guide the design of the intervention, reported statistically significant effects on risk behaviour among young males (engaging in intercourse with more than 1 sexual partner: Adjusted Rate Ratio (ARR): 0.69; and use of condoms during intercourse: ARR: 1.47). However, no statistically significant effect on risk behaviour was observed among females (engaging in intercourse with more than 1 sexual partner: ARR: 1.04; use of condoms during intercourse: ARR: 1.12). Of the two studies (Cowan et al., 2010; Maro et al., 2009) that used a theory to guide the development of the intervention, one did (20%) (Maro et al., 2009) and one (20%) (Cowan et al., 2010) did not report statistically significant intervention effects on risk behaviour (use of condoms: AOR: 0.93-1.03; having multiple sexual partners: AOR 0.86-0.91).

Number and Type of Components

In the four studies (Cowan et al., 2010; Maro et al., 2009; Pettifor et al., 2005; Ross et al., 2007) that investigated the outcome of knowledge, the intervention consisted of combined

components. Three of these studies did (Maro et al., 2009; Pettifor et al., 2005; Ross et al., 2007) and one did not report statistically significant effects on knowledge (Cowan et al., 2008).

A multi-component intervention was implemented in the five studies examining risk behaviours as an outcome. Three studies (60%) (Eurlkar et al., 2004; Maro et al., 2009; Pettifor et al., 2005) reported statistically significant effects on risk behaviours. One study (20%) (Ross et al., 2007) showed statistically significant effects on risk behaviours in young males but not in young females. One study (20%) (Cowan et al., 2008) indicated the intervention had no statistically significant effects on risk behaviour (Table 3).

Dose

The dose of the intervention was operationalized in terms of amount, frequency, and duration.

1. Amount

Two of the four studies focusing on knowledge outcome described the amount of the intervention dose. The amount was 40 minutes in one study (Ross et al., 2007) and 3 hours in the second study (Cowan et al., 2008). Of the two studies, one (Ross et al., 2007) did and one (Cowan et al., 2008) did not find statistically significant effects on knowledge. Similarly, the two studies (Maro et al., 2009; Pettifor et al., 2005) that did not describe the amount of the intervention reported statistically significant differences in knowledge at post-test.

Of the five studies evaluating the outcome of risk behaviours, three indicated the amount of the intervention dose (Cowan et al., 2010; Eurlkar et al., 2004; Ross et al., 2007). The amount was 40 minutes (Ross et al., 2007), 3 hours (Cowan et al., 2010) and a range between 90 and 120 minutes (Eurlkar et al., 2004). Only Eurlkar et al. (2004) reported statistically significant effects

on risk behaviours. Cowan et al. (2010) found no statistically significant differences in the outcome between the intervention and comparison groups; and Ross et al. (2007) reported statistically significant effects of the intervention in young males but not in young females. Two (40%) of the studies that did not report on amount (Maro et al., 2009; Pettifer et al., 2005) found statistically significant influences of the intervention on risk behaviours.

2. Frequency

Of the four studies reporting on knowledge as an outcome, two (50%) (Cowan et al., 2009; Ross et al, 2007) reported on the frequency of the intervention delivery. One of these studies (Cowan et al., 2009) did not and one (Ross et al., 2007) did find statistically significant effects of the intervention on knowledge. The results of the two studies (50%) (Maro et al., 2009; Pettifer et al., 2005) that did not report on the frequency, revealed statistically significant influence on knowledge.

Of the five studies reporting on risk behaviours, two (40%) (Maro et al., 2009; Pettifer et al., 2005) did not provide information on the frequency of the intervention delivery; yet, their results indicated statistically significant intervention effects on the outcome. Of the three studies that provided information on frequency (Ross et al., 2007; Cowan et al., 2008; Erulkar et al., 2004); one (20%) (Erulkar et al., 2004) did and one (20%) (Cowan et al 2008) did not find statistically significant effects. Ross et al.'s (2007) results revealed statistically significant intervention effects on risk behaviour in young males only.

3. Duration

Of the four studies focusing on the outcome of knowledge, three (Cowan et al., 2008; Maro et al., 2009; Ross et al., 2007) described the duration of the intervention delivery. Two

(Maro et al., 2009; Ross et al., 2007) of these did and one (Cowan et al., 2008) did not show statistically significant effects on knowledge. Pettifer et al. (2005) did not report on the duration of the intervention but found statistically significant influence on knowledge.

Of the five studies focusing on the outcome risk behaviours, four described the duration of the intervention delivery (Cowan et al., 2008; Erulker et al., 2004; Maro et al., 2009; Ross et al., 2009). Of these, two did (Erulker et al., 2004; Maro et al., 2009) and one (Cowan et al., 2008) did not show statistically significant influence on risk behaviours. Ross et al.'s (2009) results revealed statistically significant intervention effects in young males only. Pettifer et al. (2005) did not report on the duration of the intervention but found statistically significant effect on risk behaviours.

Mode of Delivery

The mode of delivery was operationalized in terms of strategy and format.

Strategy

In the four studies (Cowan et al., 2010; Maro et al., 2009; Pettifor et al., 2005; Ross et al., 2007) that investigated knowledge, two (50%) (Pettifor et al., 2005; Ross et al., 2007) interventions that used a combined strategy, showed statistically significant intervention effects on knowledge. The results of two studies (Cowan et al., 2010; Maro et al., 2004) that used a face-to-face strategy, one did (25%) (Maro et al., 2004) and one (25%) (Cowan et al., 2010) did not report statistically significant intervention effects on knowledge (Table 3).

Of the five studies evaluating the outcome of risk behaviours, three (60%) (Cowan et al., 2010; Erulker et al., 2004; Maro et al., 2009) used a face-to-face strategy. Of these, two did (Erulker et al., 2004; Maro et al., 2009) and one (Cowan et al., 2010) did not report statistically

significant intervention effects on risk behaviours. Of the two (Pettifor et al., 2005; Ross et al., 2007) studies that used a combined strategy, one (20%) (Ross et al., 2007) showed statistically significant intervention effects in young males but not in young females and one did (20%) (Pettifor et al., 2005) show statistically significant intervention effects on risk behaviours.

Format

Of the four studies focusing on knowledge, only one (25%) (Maro et al., 2009) described the format of the intervention as group and reported statistically significant effects on knowledge. In the three studies (75%) (Cowan et al., 2010; 2009; Pettifor et al., 2005; Ross et al., 2007) that described the format of the intervention as mixed, two did (Pettifor et al., 2005; Ross et al., 2007) and one (Cowan et al., 2010) did not show statistically significant effects on knowledge.

Of the five studies reporting on risk behaviours, only two (40%) (Erulkar et al., 2004; Maro et al., 2009) described the format of the intervention as group and reported statistically significant effects on risk behaviours. Of the remaining three studies (Cowan et al., 2010; Pettifor et al., 2005; Ross et al., 2007) which described the format of the intervention as mixed, one did (20%) (Pettifor et al., 2005) and one did not (20%) (Cowan et al., 2010) report statistically significant intervention effects on risk behaviours. However, Ross et al. (2007) reported statistically significant intervention effects in young males but not in young females.

Teaching Method

Four studies applied a mixed teaching method for providing the intervention and evaluated its effects on knowledge. Of these, three did (75%) (Maro et al., 2009; Pettifor et al.,

2005; Ross et al., 2007) and one (25%) (Cowan et al., 2010) did not report statistically significant intervention effects on knowledge.

All five studies applied a mixed teaching method for providing the intervention and examined its effects on risk behaviours. Three did (60%) (Erulkar et al., 2004; Maro et al., 2009; Pettifor et al., 2005) and one did not (20%) (Cowan et al., 2008) report statistically significant intervention effects on risk behaviour. One (20%) study (Ross et al., 2007) indicated the intervention had a statistically significant effect in young males but not in young females.

Table 3

Reported Interventions' effects on Knowledge and Risk Behaviour Outcome

Outcome	No significant effect	Significant Effect
Knowledge	Cowan et al (2008) Cowan et al (2010) [AOR: 1.09-1.16]	Ross et al (2007) Hayes et al (2005) [CI: 1.14-1.25, 1.67-1.75] Maro et al (2009) Pettifor et al (2005) Stadler (2002)
Risk Behaviour	Cowan et al (2008) Cowan et al (2010) [use of condom: AOR: 0.93-1.03] [more than 2 sexual partners: AOR: 0.80-0.91] *Ross et al (2007) Hayes et al (2005) [greater than 1 sexual partner: ARR: 1.04]	Maro et al (2009) Pettifor et al (2005) Stadler et al (2002) [used condom when having sexual intercourse: 78%] [decreased number of sexual partners: 69%] Erukar et al (2004) [use of condom: 32% -45%] [More than 3 sexual partners in last 3 years: 5-24%] *Ross et al (2007) Hayes et al (2005) [greater than 1 sexual partner: ARR: 0.69]

***Ross et al (2007) reported statistically significant effects for young males, but not young females.**

Characteristics of Outcomes

The following section describes the characteristics of knowledge and risky behaviour as outcomes.

Knowledge

Four intervention studies evaluated the outcome of knowledge. Only two (50%) reported on the tool used to measure knowledge (Cowan et al., 2008; Maro et al., 2009). The tools were Audio-Self Administered Questionnaire (SAQ) (Cowan et al., 2008) and HIV- Knowledge Questionnaire (HIV-K-Q) (Maro et al., 2009). The reliability of the tools was only reported in one study (Maro et al., 2009), and the remaining articles did not report on the reliability of the tool used.

Risk Behaviour

Of the five intervention studies evaluating the outcome risk behaviour, only one (Cowan et al., 2010) (20%) reported on the tool used to measure risk behaviours. The tool was Audio-Self Administered Questionnaire (SAQ) (Cowan et al., 2010). The reliability of the tools was reported in one study (Maro et al., 2009), but not in the remaining articles.

DISCUSSION AND IMPLICATIONS

This chapter is a discussion of the results of the systematic review, specifically on the characteristics of the interventions and their effects on knowledge and risk behaviour outcomes. The limitations of the systematic review are identified, and the implications of the results for theory, practice, and research are presented.

The HIV epidemic has significantly affected young persons, amid estimates of 6,000 and 7,000 becoming infected each day (UNAIDS, 2010). The HIV epidemic continues to financially, economically, and socially devastate Africa. This impacts the ability of young persons to receive the knowledge and skills to prevent the contraction of HIV, highlighting the importance of looking at alternative HIV prevention initiatives such as community based interventions. As such, community based prevention interventions have the potential to reach hard to reach young persons where they spend most of their time (Maticka-Tyndale & Barnett, 2010). The interventions provide them with knowledge and skills to prevent the acquisition of HIV (Ross et al., 2006).

The objectives of this systematic review were to examine the characteristics of community based HIV prevention interventions implemented in Africa, specifically the theoretical underpinning, type and number of components, dose, mode of delivery and teaching method; and to explore the effects of these characteristics on knowledge of HIV prevention strategies and engagement in risk behaviour among young persons in Africa. Knowledge of intervention characteristics that are associated with improvement in outcomes would assist in the

development of effective and efficient community based interventions to prevent HIV among young persons in Africa.

Discussion of Findings

The number of studies selected for review was small. The findings of this systematic review showed variability in the design of community based interventions for the prevention of HIV in young adults residing in African countries. Most interventions were not theory-based, were delivered through multi-components, mixed teaching method, different modes, and at different doses. Despite this variability, most interventions were found effective in enhancing HIV knowledge and decreasing risk behaviour among young persons.

Theory

The findings related to the use of theory were inconsistent. The studies which did not use a theory to guide the development of the intervention reported statistically significant effects of the intervention on knowledge and risk behaviour. The two studies which used a theory had inconsistent findings. One study (Cowan et al., 2008) vaguely described the application of theory whereas the other study (Maro et al., 2009) simply identified the theory which informed the intervention design. Inconsistent use of theory found in this review has also been observed in studies on community-based interventions conducted in developing countries (Maticka-Tyndale & Brouillard- Coyle, 2006) and school-based interventions implemented in Sub-Saharan Africa (Paul-Ebhohimhen, Poobalan & Van Teijlingen, 2008). The findings of this review showed no differences in the effectiveness of theory-based and non-theory informed interventions. This may be explained by the small number of studies included in the review. The literature suggests theories are essential in guiding the design of interventions, and in particular those targeting

behaviour change (Blue & Black, 2005; Sidani & Braden, 2011) such as sexual risk behaviours investigated in this systematic review. Theory-based interventions are reported to be more effective than interventions that are not theoretically informed (Painter, Hynes & Glanz, 2008; Noar & Zimmerman, 2005). The following offers an explanation: 1) theoretical frameworks provide a clear understanding of the aspects of the problem or the determinants of behaviour that are amenable to change; 2) the frameworks give direction in the identification of factors that may influence the effectiveness of the intervention and of strategies to address these factors; and 3) elaboration of the process mediating the effects of the intervention on the ultimate outcomes (Blue & Black, 2005; Fishbein, 2000; McGilton et al., 2009). Accordingly, the intervention is carefully designed to target the respective aspect of the problem or determinant of the behaviour and affect the mediating variables, which induce the hypothesized changes in the ultimate outcomes (Foy et al., 2007; Sidani & Braden, 2011).

The use of theoretical frameworks to inform the intervention is controversial (Jefferey, 2004; Griffin, Kinmonth, Skinner & Keylly, 1999; Oxman, 2005; Rothman, 2004; Webb, Joseph, Yardley & Michie, 2010). Some scholars suggested that this practice has the potential to limit researchers and interventionists in acquiring a comprehensive understanding of the presenting problem. Theoretical frameworks offer restricted perspectives on the identified problem, thereby potentially overlooking other aspects of the problem or determinants of the behaviour that persons may experience (Sidani & Braden, 2011). Consequently, the intervention may not be responsive to their characteristics or successful in addressing the problem as experienced (Sidani & Braden, 2011).

Theories that were commonly used to guide the design of HIV prevention research include: Social Cognitive theory (Crepaz et al., 2006); Cognitive behavioural coping (Crepaz et

al., 2006); Theory of Planned Behaviour (Crepaz et al., 2006; Rotheram-Borus, O'Keefe, Kracker, & Foo, 2000); Theory of Reasoned Action (Rotheram-Borus et al., 2000; Fishbein, 1979); and Health Belief Model (Rotheram-Borus, et al., 2000; Rosenstock et al., 1994). These theories focus primarily on the individual's behaviour, and may not be very relevant in the design of HIV prevention interventions targeting young persons residing in Africa. The complexity of the HIV epidemic in the latter continent emphasizes the importance of recognizing the interaction among a young persons' behaviour and their "social, economic, and cultural" environment (UNAIDS, 1999, p. 8). As such, the theories selected to inform a community-based HIV prevention interventions should account for the context (such as social and economic) that influences young African persons' behaviour (UNAIDS, 1999).

Type and Number of Components

In all reviewed studies, the HIV prevention intervention comprised two components, and the majority reported statistically significant effects on knowledge and risk behaviour. Educational components included information on reproductive and sexual health, general information on HIV, methods of HIV prevention, and HIV testing. Behavioural components included the adoption of safer sexual practices and behaviour (e.g. sexual negotiation skills), use of preventative activities during intercourse (e.g. use of contraceptives), and the reduction of the number of sexual partners. This finding is consistent with previous results indicating that multi-component interventions are more effective than single-component interventions in the promotion of physical activity, management of Warfarin therapy, and delirium (Beyth et al., 2000; Blue & Black, 2005; Litzeiman et al., 1993; Milisen, Lemiengre, Braes & Foreman, 2005; Van Sluijs, McMinn & Griffin, 2007). Furthermore, findings were consistent with those of a meta-analysis of HIV prevention interventions for persons living with HIV (Crepaz et al., 2006).

The meta-analysis of 12 studies reported on interventions with educational and behavioural components to reduce risk behaviours among persons living with HIV; the multi-component interventions were found effective in improving the outcomes of interest.

Providing an educational component (i.e., HIV-related information) alone, although useful and necessary in raising awareness and improving knowledge, is insufficient and inadequate in altering risk behaviour and motivating application of health behaviour (Gold et al., 1994; Jagdeo, 1996; Shepherd, Peersman, Weston & Napuli, 2000; Shipley, 2008). A behavioural component complements the effects of the educational component in that it focuses on knowledge acquisition, which is a pre-requisite for behaviour performance (Coleman & Ford, 1996), and on supporting behaviour change such as the adoption of safer sexual practices through negotiation skills and preventative activities (e.g. using contraceptives). The educational and behavioral components provide young person's opportunities to learn and apply new skills into their daily life. Thus, incorporating multiple components has the potential to create a synergistic effect (Brown, Trujillo, & Macintyre, 2001, p. 62).

Dose

The descriptions of the dose were vague and often not reported in the reviewed studies, posing a challenge in determining the exact intervention dose of the community-based HIV prevention interventions actually delivered. A few studies reported on the amount, frequency and duration of the interventions. The results showed a range in the length and number of sessions, and in the duration of the HIV prevention interventions. In addition, the justification of the dose for the interventions was not provided, which raises concerns regarding the integrity and fidelity of the treatment delivered to participants (Blue & Black, 2005). Dose-related information is important for monitoring fidelity of intervention implementation as it indicates whether the

intervention was given according to plan (Brandt, Kirsch, Lewis & Casey, 2004; Carroll, Patterson, Wood et al., 2007).

Despite limited information reported on dose of the interventions, the results of this systematic review supported the effectiveness of the interventions in achieving the outcomes. These results are not consistent with those obtained in other studies evaluating educational or behavioural interventions. The latter findings indicated that in general, interventions with a large number of sessions (Fredericks, Ibrahim & Puri, 2009; Fredericks, Guruge, Sidani & Wan, 2010; Fan & Sidani, 2009) given over a long period (e.g., high dose) (Agurs-Collins et al., 1997; Brown, 1992; Crepaz et al., 2006; Fan & Sidani, 2009), are more effective (e.g. demonstrate larger effect sizes) in comparison to interventions with shorter sessions and duration. However, the relationship between dose and outcome is controversial. Germain et al. (2006) and Edinger et al. (2007) found that “brief” (e.g. comprised of few sessions) behavioural treatments produced optimal effects in adults and older adults with insomnia. The exact reason for the inconsistent findings related to the effect of varying dose levels on outcomes needs further exploration.

Findings from HIV prevention research showed that in general, HIV prevention interventions tended to be delivered in a large number of sessions and given over longer period of time; this high intervention dose yielded larger effects on the outcomes (Crepaz et al., 2006; Cleary et al., 1995; Gallant & Maticka-Tyndale, 2004; Klepp et al., 1997; Margolin et al., 2003; Rotheram-Bours et al., 2004; Shuey et al., 1999; Wingood et al., 2004; Wolitski et al., 2005). HIV prevention interventions delivered in intensive manner and longer duration may provide young persons with the opportunity to master the skills (e.g. negotiation skills) and knowledge needed to engage in health sexual behaviour and decrease engagement in risk behaviours.

Results of this systematic review highlight the importance of clarifying the dose of the interventions in study reports and of examining the dose-response relationships in systematic reviews in order for healthcare professionals to design and deliver interventions with optimal effectiveness in the prevention of HIV. Relevant data can be analyzed to examine the association between the dose received and the outcomes achieved by participants. Determining the dose-response analysis is essential for designing interventions that are most effective in improving outcomes (Sidani & Braden, 2011).

Mode of Delivery

There were no consistent patterns evident for the strategy of the intervention implementation. Although different strategies were used in the studies reviewed, the most frequent was face-to-face and a combination of written material, video, and face-to-face contact. Findings for the format of intervention implementation were also inconsistent. Majority of studies reported group and mixed formats which were associated with significant changes in knowledge and risk behaviour.

This was similar to the results of a meta-analysis on diabetes self-management, which reported larger effect sizes for mixed format in comparison to group format (Fan & Sidani, 2009). In addition, findings from a systematic review on postoperative patient education reported the use of mixed modalities enhanced knowledge and behaviour for post-operative patients (Fredericks, et al., 2010). Furthermore, studies on HIV prevention interventions reported using mixed modalities to increase knowledge and engagement in health sexual behaviours among young persons living with HIV (Crepaz et al., 2006; Wingwood et al., 2004; Patterson, Shaw & Semple, 2003; Rotherman-Borus et al., 2001) and not living with HIV (Gallant & Maticka-

Tyndale, 2004; Fitzgerald et al., 1999; Kinsman et al., 2001; Khun et al., 1994; Klepp et al., 1997; Shuey et al., 1999).

These findings highlights the importance of using different modes of delivery when designing interventions to provide learning opportunities to young persons through various modes such as written (e.g. brochure), media (e.g. radio, television), and face-to-face (e.g. drama, and recreational activities) that may be responsive to different learning styles. Findings from the literature report that consistency between mode of delivery and learning styles has been found to enhance learning (Buch & Bartley, 2002; Kolb, 1984).

Teaching Method

A mixed teaching method was most frequently used for the delivery of the intervention across studies. The majority of studies reported statistically significant effects of the intervention on knowledge and risk behaviour. The use of mixed teaching method for the delivery of the intervention may have been used to meet the various learning needs, styles, and preferences of young persons living in Africa. Similar findings related to the effectiveness of mixed teaching method in achieving outcomes of interest were reported by Fan and Sidani (2009), Fredericks et al. (2009), Litzelman et al. (1993), and Roter et al. (1998). In addition, similar findings were reported in a meta- analysis of the impact of HIV prevention interventions on risk behaviours for persons living with HIV (Crepaz et al., 2006), a review of school-based HIV prevention programmes targeting African youth (Gallant & Maticka-Tyndale, 2004), and a life skills program on young persons in South Africa (James, Reddy, Ruiter, McCauley & van Den Borne, 2006). Designing and providing interventions that are consistent with participants' preferences have been found to enhance uptake, satisfaction, and adherence with treatment, and therefore improvement in outcomes (Sidani, Epstein, Miranda & Fox, 2009).

The mixed teaching method entailed a combination of didactic teaching approaches such as print material and lecture, and interactive teaching methods such as drama, story-telling, soccer, and role-play. The use of such method promotes learning. In addition to relaying information, the application of mixed teaching methods facilitates participants' engagement in the learning process. Thus, young persons are not passive learners, but rather active learners. Active participation in learning has been hypothesized to increase the retention of information, and meet the various needs and learning styles of young persons (Ito, Kalyanarman, Ford, Brown & Miller, 2008).

Limitations

A small number of research studies met the eligibility criteria and were included in the systematic review. Overall, findings of this systematic review suggest community based HIV prevention interventions yield desired effects on knowledge and risk behaviour among young Africans. This limited the ability to compare and contrast the contribution of the intervention characteristics on the outcomes, which aimed at informing healthcare professionals of the most effective characteristics. Such information could guide the design of efficient interventions. In addition, there are diversities in cultural practices, believes, traditions and religions within a community, which may impact the generalizability of community-based HIV prevention interventions that are implemented in Africa. To address the diversity within communities, researchers may use a community participatory research approach in the development of community-based HIV prevention interventions. This approach allows for collaboration and active participation of community members, leaders, and academic researchers in the design, implementation, and evaluation of interventions. Thus, the interventions are responsive to their characteristics and preferences, and are well received (Rhodes, Malow & Jolly, 2010).

Implications

Theory

Few studies included in the review evaluated community based HIV prevention interventions that were theory-informed. The use of a theory in the design of interventions is important to enhance their effectiveness and efficiency. The use of theory identifies the aspect of the problem that is amenable to change and the strategies of the intervention to target the aspect of the problem that can be modified. This maintains the specificity of the intervention which in turn, improves the overall effectiveness of the intervention in addressing the problem (Sidani & Braden, 2011, p. 48) and enhances the understanding of the mechanism that is underlying the effects of the intervention (Michie, Johnston, Francis, Hardeman & Eccles, 2008; Thompson, Baranowski, Cullen & Baranowski, 2007; Sidani & Braden, 2011). The effectiveness and efficiency of the intervention is enhanced because the aspects contributing to the problem is addressed and not overlooked (Green, 2000; Sidani & Braden, 2011) and the active ingredients of the intervention are identified from that of “nonessential” elements of the intervention through the use of theory (Sidani & Braden, 2011, p. 48).

Various theories would be appropriate to inform the development of community based HIV prevention interventions targeting young persons in Africa. The shift from theories that focus on the individual level to that of theories that account for social, cultural, and economic influences on young persons’ behaviour is supported in the literature (Latkin & Knowlton, 2005) for the prevention of HIV. An example of a theoretical framework that may be used in HIV prevention research that accounts for social, cultural, and economic influences is the ecological systems theory. Finally, researchers are recommended to develop, apply, and test intervention theories beyond the individual level, and shift focus to community based levels in order to

advance the effectiveness of community based interventions in promoting engagement in health behaviour (Painter et al., 2008). Sidani and Braden (2011) have described several strategies for developing an intervention theory and for evaluating the relevance of theory and the intervention to persons of diverse cultural backgrounds.

The reports of the studies reviewed did not provide a clear description of the process followed in the application of theory. Future studies should clarify the selection process and operationalization of theory that directed the design and implementation of community based interventions. This clarification will provide indication of how researchers and clinicians should select the theory that best fits with the target population's problem, and how to use the theory to inform the development of the intervention.

Practice

Although the focus has been on community based interventions, some of the findings related the intervention characteristics, such as use of mixed teaching method and multiple components could be applicable to various HIV prevention peer led or school based interventions. The use of mixed teaching methods addresses the different learning preferences, styles and needs of young persons. Mixed teaching method allows for the active participation of young persons and promotes the “internalization of information” provided by the healthcare provider. It also allows for the practice of various techniques (e.g. negotiation skills) to promote engagement in health sexual behaviour (James et al., 2006, p. 292). Examples of mixed teaching method included activities such as soccer, role play, body mapping, drama, print material and educational sessions. By including these teaching methods, the interventions would be appealing to young men and women and would increase uptake of the information taught. The goal of these interventions is to decrease the rate of HIV transmission and this may be done by enhancing

knowledge and application of risk behaviour for young persons by the implementation of most effective intervention characteristics such as mixed teaching method and multi-components.

Research

Firstly, some of the studies included in this systematic review, did not provide thorough descriptions of the intervention characteristics. This poses a concern for evaluating the fidelity of intervention implementation and a challenge for healthcare providers and researchers in replicating the community based HIV prevention interventions. This is an issue as it is unknown whether there were deviations of the delivery of the intervention compared to the original design and plan. Deviations in the delivery of the intervention is a challenge in knowing what elements of the intervention was delivered to the target population; such variations result in inconsistencies in the dose and activities of the intervention to which the target population is exposed (Sidani & Braden, 2011), and is associated with variability in outcome achievement, which affects conclusions related to the overall effectiveness of the interventions (Dumas, Lynch, Laughlin, Smith & Prinz, 2001; Sidani & Braden, 2011). Reports of future studies should attempt to incorporate this information in the description of interventions to monitor fidelity.

Continued focus is needed to evaluate the overall effectiveness of community-based HIV prevention interventions on young women's engagement in risk and sexual health behaviour. Ross et al. (2007) reported no statistically significant effect of the intervention on risk behaviour among young women, highlighting the need to further investigate gender differences in the responses to HIV prevention interventions (McCoy et al., 2009; Turmen, 2003). Social factors such as inequality, violence, and lack of education have the potential to influence young African women's engagement in risk behaviour and in turn their risk of contracting HIV.

Additional research is needed to evaluate community based HIV prevention interventions targeting young persons. Providing these interventions in community settings may reach young persons who are hard to reach regardless of their socioeconomic and school enrolment status, and geographic location of their residence (Maticka-Tyndale & Barnett, 2010). In addition, because community based interventions are delivered within the community they have the potential to reach a large number of young persons who are at the “centre” of the epidemic (Ross, Dick & Ferguson, 2006, p. 244) that may or may not be enrolled in school. This in turn, may provide “booster” sessions to those already receiving information from in-school programmes and yield a larger effect on HIV-related knowledge and in building skills to engage in health sexual behaviour as a means of HIV prevention (Nation et al., 2003, p. 453; Ross et al., 2006).

Although there have been systematic reviews (e.g. Gallant & Maticka-Tyndale, 2004; Maticka-Tyndale & Brouillard-Coyle, 2006) and meta-analysis (Crepaz et al., 2006) conducted, the reviews did not clearly examine the contribution of the characteristics of community-based HIV prevention interventions to the outcomes particularly in Africa. Furthermore, future research studies should focus on examining the effects of community based intervention characteristics that were inconclusive in this review, specifically on use of theory, dose, and mode of delivery. This may be facilitated with an instrument to collect data on the intervention dose in individual and meta-analytic studies. The instrument should capture information on the amount, frequency, and duration of the intervention received by participants. Studies may build on the preliminary findings of this review and expand on the development of effective community based HIV prevention interventions. This will provide young persons with the tools and knowledge needed to engage in safer sexual practices and the prevention of HIV.

CONCLUSION

This systematic review identified characteristics of community based HIV prevention interventions and evaluated through vote-counting their effectiveness on enhancing HIV-related knowledge and decreasing engagement in risk behaviour among young persons in Africa. This is the first study to review and evaluate community based HIV prevention interventions and findings will inform future research studies and practice. The evidence supports using multi-components (educational and behavioural), mixed mode of delivery and teaching method to influence HIV related knowledge and risk behaviour outcomes. Although findings were inconclusive on theoretical underpinning and dose, literature supports interventions which are guided by theory and have more sessions given over long periods. Sustained focus on developing and evaluating community based HIV prevention interventions targeting young persons is imperative because of the continued burden and impact of the epidemic on young persons living in Africa.

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