

AN INTERVENTION TO INCREASE INTENTIONS AND BEHAVIORAL SKILLS
TO POSTPONE SEXUAL ACTIVITY IN CAMEROONIAN PREADOLESCENT
FEMALE STUDENTS.

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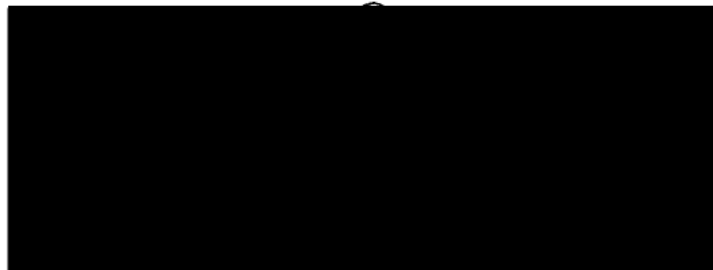
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AND BEHAVIOR SKILLS TO POSTPONE SEXUAL
ACTIVITY IN CAMERDONIAN PREADOLESCENT
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Abstract

Acquired Immune Deficiency Syndrome (AIDS) is an escalating problem in sub-Saharan Africa. According to the World Health Organization, the disease constitutes a threat to the health of adolescents in this region. One of the countries in this region with a growing prevalence of AIDS is Cameroon, where an estimated one in four adolescents is at risk for contracting this disease. Little is known, however, about effective strategies that can assist adolescents in this country to reduce their vulnerability. The specific aim of this study was to test the effectiveness of a school-based intervention delivered to pre-adolescent Cameroonian girls to: 1) increase intentions to postpone sexual activity and 2) increase sexual-abstinence behavior skills. A secondary aim was to determine the age and cultural appropriateness of the intervention. A pretest/posttest quasi-experimental design was used. Participants included 60 female students from a primary school in Buea, Cameroon. The students received a pretest measuring intentions to postpone sexual activity and sexual-abstinence behavior skills followed by an educational intervention based on the Theory of Planned Behavior. A posttest was then administered to measure the same variables as in the pretest. The posttest included a one-page open-ended questionnaire assessing the age and cultural appropriateness of the intervention. Exact paired t-tests were used to compare pretest and posttest scores. Effect sizes and confidence intervals were also estimated for each of the two dependent variables. The alpha level was set *a priori* at 0.05. The one-page questionnaire was assessed using quasi-quantitative analyses to assess students' perceptions on appropriateness of the intervention. The intervention was effective in increasing intentions to postpone sexual activity ($t=3.40$; $p<.05$) and sexual-abstinence behavior skills ($t=4.51$; $p<.05$). Effect sizes were moderate, with narrow 95% confidence intervals (.66; CI= .59-.73 and .75; CI=.67-.83 respectively). Most participants (>75%) also perceived that the intervention appropriate. The findings provide a basis for a large randomized community trial using these instruments and intervention. If these findings are replicated with larger random samples the intervention could be used by policy makers, public health planners, and community health nurses to reverse the rapidly escalating HIV infection rates in Cameroon.

To Papa and auntie Florence whose short and exemplary lives keep me grounded

and

To Nico, Mama, Sister Felly, and Uncle Ivo whose love, understanding, thirst for
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CHAPTER 1

Acquired Immune Deficiency Syndrome (AIDS) is a rapidly escalating problem in Africa. Adolescents have long been considered a group at risk. According to the World Health Organization (WHO), the disease constitutes a severe threat to the future health and well being of adolescents in this region of the world (2003). In general, the magnitude of the problem in sub-Saharan Africa calls for urgent interventions. With an estimated 77% of the global burden of human immunodeficiency virus (HIV) carried by the people of sub-Saharan Africa, this region hosts many cities where prevalence rates among the young exceed 30% (WHO, 2003). At the same time, with per capita incomes less than \$200 in many of these African countries, biomedical prevention and treatment therapies are simply not affordable for the vast majority of citizens (Hunter, 1996).

HIV, the virus responsible for AIDS, is transmitted when infected blood, semen or vaginal secretions from one person are deposited onto a mucus membrane or into the blood stream of another person (Porth, 2002). According to the Joint United Nations Program on HIV/AIDS (UNAIDS), the two primary modes of transmission of the virus in this region are heterosexual contact and mother to infant transmission. Infants are infected through transplacental transmission of the virus, as well as during childbirth and breastfeeding. These babies frequently die early because of the lack of anti-viral therapy. Those not infected at birth are at low risk for HIV infection until puberty when sexual activity is initiated (Joint United Nations Program on AIDS/UNAIDS, 2003). The virus

can also be transmitted through the sharing of intravenous needles, same sex intercourse and poor sterile techniques with medical equipment. While some of these routes play an important role in transmitting the disease in other parts of the world, the predominant route for transmission in sub-Saharan Africa is heterosexual contact (UNAIDS, 2003).

Multiple sexual partners, unprotected sexual intercourse, and early initiation of sexual activity are known risk factors in sub-Saharan Africa (UNAIDS, 2003). Another identified contributing factor to the heterosexual transmission of HIV in this region is age mixing. The majority of young females age 11 to 19 in this region report initiating sexual intercourse with men that are in their twenties or older (Laga, Schwartlander, Pisani, Sow, & Carael, 2001; WHO, 2000). Age mixing increases the risk for infection because men in their twenties are more likely to have been sexually active for many years and therefore have a higher chance of being infected than younger males. In addition, there is a higher tendency for tears to occur during intercourse with preadolescent females who have smaller, immature genitals, thereby increasing the risk for HIV infection (Laga et al., 2001).

One of the countries in this region with a growing prevalence of HIV is Cameroon. Cameroon is a coastal nation, located between west and central Africa. It is surrounded by Nigeria to the northwest, Chad and Central African Republic to the East, and Congo, Gabon and Equatorial Guinea to the south. Figure 1 is a map showing the huge number of HIV infections in Sub-Saharan Africa in relation to the rest of the world, and a list of the countries in this region.

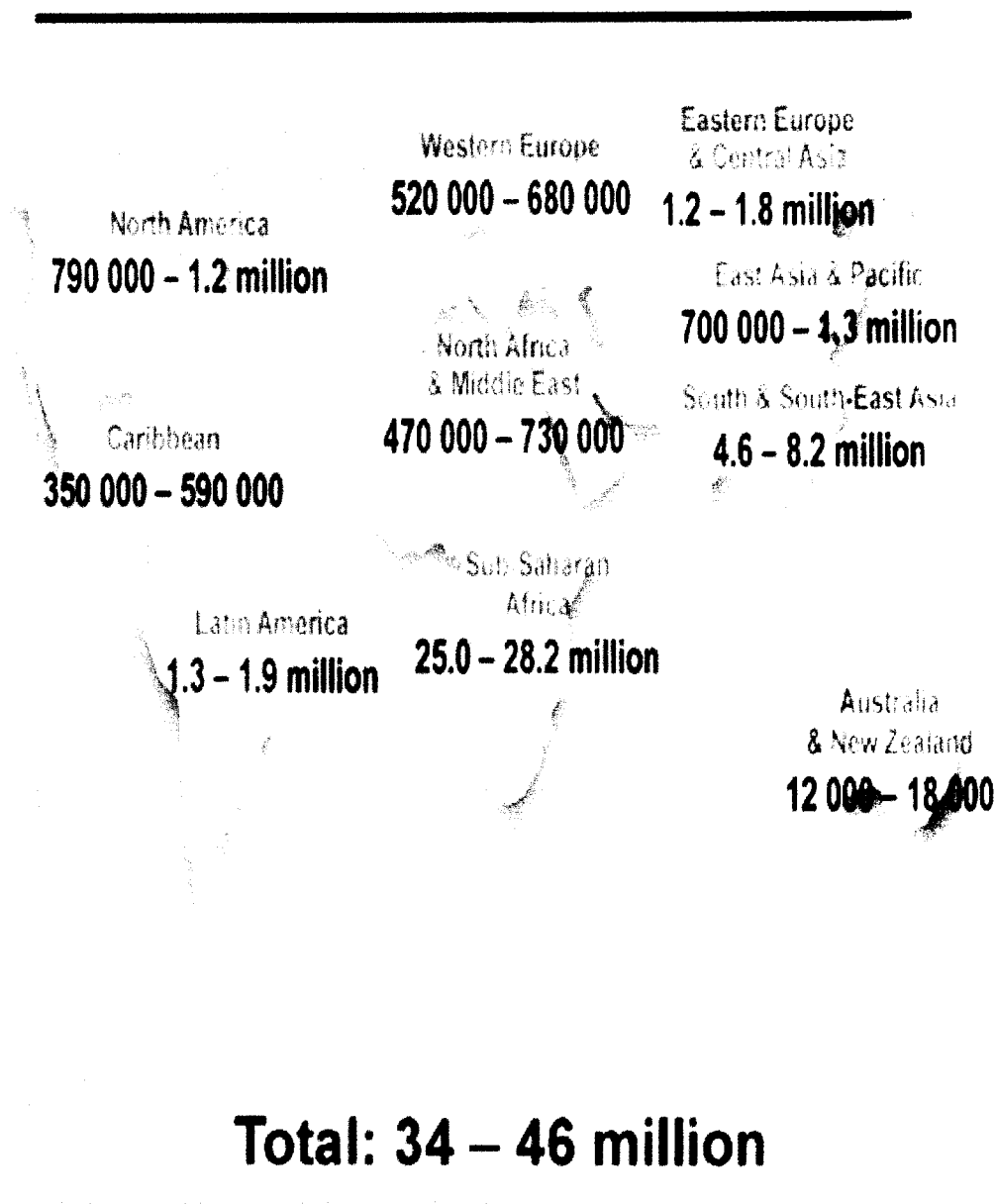


Figure 1. Adults and Children Estimated To Be Living With HIV/AIDS at The End Of 2003

(Source: UNAIDS, 2003. The countries in sub-Saharan Africa include: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Congo, Cote d'Ivoire, Democratic Republic of Congo, Djibouti, Eritrea, Ethiopia, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Malawi, Mali, Mauritania, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Swaziland, Tanzania, Togo, Sao-Tome-Principe, Uganda, Zambia, and Zimbabwe)

According to the World Almanac & Book of Facts (2003) Cameroon has a total population of about 16 million people with about 42 percent of the population less than 14 years of age. Forty six percent of this population lives in urban areas. Ethnic groups include Cameroon highlanders (31%), Equatorial Bantu (19%), Kirdi (11%), Fulani (10%), and North West Bantu (8%). Major religions include indigenous African beliefs (51%), Christianity (33%), and Muslims (16%).

Cameroon is a republic with a democratic system of government that has a president, a prime minister and a parliamentary system. However, since 1982, the same president has ruled the country. The country is divided into ten administrative provinces headed by governors. Two of these provinces are predominantly English speaking, while the remaining eight are French speaking. The British colonized the English-speaking provinces, while the French colonized the French speaking provinces. French and English are recognized as the official languages of the country. Life expectancy at birth is only about 55 years. Adult literacy is estimated at 63 % of the total population (World Almanac & Book of Facts, 2003).

The economy is highly dependent on oil production and refining, food processing and the production of light economic goods. Seventy percent of the labor force is involved in agriculture and 13% in industry and commerce. The economy was considered good and better than most countries in Africa until the mid 80s. Since then the economy has been experiencing a decline in growth due to the fall of the oil boom in the 1980s. Unemployment has been estimated to be as high as 30% (World Almanac & Book of Facts, 2003).

According to the UNAIDS, in Cameroon the HIV prevalence rate for persons aged 15-49 climbed from 1% in 1988 to 7% in 1998 (UNAIDS, 2001). This represents a dramatic increase in a single decade. The continuing increase in new infections is also evident in the latest available data showing infection rates at 11.9 % in the year 2001 (UNAIDS, 2003). Even more disturbing are estimates that one in four adolescents is in danger of contracting the disease (Musa, 1998). Equipping adolescents with the skills necessary to reduce their vulnerability has been identified by the Ministry of Health in Cameroon as the key to controlling HIV infections (Musa, 1998).

Among adolescents who engage in HIV risk taking behaviors, girls not only place themselves but also their future children at risk for HIV infection. Some experts note that Cameroonian girls are initiating sexual activity at a very early age. The WHO age-specific HIV infection rates indicate that prevalence rates fall to zero by age 9 and steadily increase among Cameroonian females as they get into their twenties (WHO, 2001). While 9-year-old girls do not seem to engage in sexual activity given the negative infection rates, by age 10 and 11, the infection rates are up to 1 per 1000 increasing tenfold to 10 per 1000 by age 20 (WHO, 2001). These data are even more important when considered in the light of the fact that HIV infection takes months and years to manifest. Based on these data, it appears that females between the ages of 10 and 20 are at risk for exposure to HIV infection through early initiation of sexual activity. Rwenge (2000) who conducted the only descriptive located in the literature that had adolescent participants from the an English speaking province in Cameroon, found that by age 14, 20 % of females in a study conducted in the northwest province of Cameroon had already had sexual intercourse. In addition, over half of these participants had already initiated

sexual activity by age 16 (Rwenge, 2000). These data point to the need for interventions targeting pre-adolescents in this country to delay the initiation of sexual activity. Such interventions may equip these preadolescents with skills that can be used to maintain safer sex behaviors as they enter their adolescent years.

Gender also plays a role in the risk of HIV infections. Females in early adolescence are at greater risk of contracting HIV in sub-Saharan Africa than males of the same age (Laga et al., 2001). In general, women of all ages are more likely than men to be infected with HIV during unprotected sexual intercourse. The vulnerability is especially high in girls as young as 10 to 12, whose genital tracts are smaller, not fully mature and prone to tears during sexual intercourse. Vaginal tears during sexual intercourse increases the risk of HIV transmission. This biological vulnerability is compounded by other cultural and social factors such as age mixing (Laga et al., 2001). These researchers also found that 17 % of unmarried teenagers in Rural Tanzania reported having sex with men at least 10 years older than themselves (Laga et al., 2001). In another study conducted among Cameroonian adolescents, Rwenge (2000) found that 81 % of females had their first sexual intercourse with older men. In addition females tend to bring a lower economic status into these sexual relationships than their male partners and consequently have lower negotiating power for safer sex practices (Laga et al., 2001; UNAIDS, 2003). Given these biological, cultural and social factors, interventions targeting 10 to 12 year old females for prevention of HIV are clearly needed in this part of the world.

This study represents a first step in a trajectory of research that will focus on HIV prevention in preadolescents and adolescents in Cameroon. The disease in this region has

multiple contributing factors that require a multi-faceted approach to control the spread of the disease. Knowledge generated from this study will inform the development of subsequent studies that have the potential to address this dire need.

Purpose

The long-term purpose of the study is to test the effectiveness of an intervention designed to promote the adoption of healthy sexual behaviors in Cameroonian preadolescent students. The intervention, which focuses on equipping students with skills that could help them negotiate abstinence, is based on constructs on Theory of Planned Behavior (Ajzen, 1988). This theory has been successfully employed in HIV prevention interventions in both developed and developing countries (Fitzgerald et al., 1999; Kim, Stanton, Li, Dickerson, & Galbraith, 1997).

This study is preliminary work aimed at helping the investigator refine intervention procedures and study instruments for future larger studies. Specifically, this study focused on assessing the intervention procedures for age and cultural appropriateness for Cameroonian preadolescent females. The research hypotheses in this study were:

In 10-12 year-old Cameroonian girls who received a school-based intervention to reduce HIV infection:

1. Intentions to postpone sexual activity will be significantly higher at follow-up than at baseline
2. Sexual abstinence behavior skills will be significantly higher at follow-up than at baseline

A secondary aim of this study was to determine if the intervention procedures and instruments appropriate for the age and culture of participants.

Presentation of Study Variables

Pretest and posttest scores will be compared on two dependent variables that mediate abstinence (Ajzen, 1988). These variables include sexual abstinence behavior skills and intentions to postpone the initiation of sexual activity. The intervention will be the independent variable for the study

Theoretical Definitions

Intentions to Postpone Sexual Activity indicate what an individual plans or projects that he or she will do in the future. Intentions to postpone sexual activity are viewed as the willingness to delay the initiation of sexual activity over a specified time period (Ajzen & Fishbein, 1980; Misovich, Fisher, & Fisher, 1998).

Sexual Abstinence Behavior Skills are the abilities needed to avoid sexual intercourse in heterosexual relationship interactions. They include recognizing risky situations, assertive communication skills with partners, and strategies to avoid compromising situations (Misovich et al., 1998; Williams et al., 1998).

Appropriateness of Intervention and instruments are participants' perceptions of the suitability of the intervention procedures and study instruments.

Significance

At present, there is no known vaccine or cure for HIV/AIDS. The pandemic is increasing at alarming rates and developing countries with the lowest per capita income continue to bear the highest burden of the disease (WHO, 2003). The impact of this disease in sub-Saharan Africa has the potential to cripple the economies of many

countries, if urgent preventative interventions are not implemented (Kachapila, 1998). The disease is a threat to people in the most productive phases of their lives, to family life, and to entire cultures and populations (WHO, 2003). Globally, AIDS is the leading cause of death in young adults (WHO, 2003). Tragically, in adolescents, the full impact of AIDS is hidden by the lengthy incubation period of the disease. Persons with AIDS, who are in their twenties, were likely infected during their adolescent and preadolescent years. Developing and testing interventions that prevent the spread of AIDS can provide insights that may ultimately reduce morbidity and mortality from the disease. Young females in particular are a group at high risk that will benefit from such interventions.

Females in Sub-Saharan Africa are initiating sexual activity at an earlier age than their male counterparts. Sexual activity not only leads to the possibility of infection, it also leads to the possibility of a pregnancy. Maternal transmission of the virus in Sub-Saharan Africa remains high. It is estimated that 15%-30% of untreated mothers will transmit the infection to the babies in utero or during childbirth, and another 10-15% of these babies will become infected through breastfeeding (Shaffer, Rongpisuthipong, & Siriwasin, 1999). Females infected with the virus and children born to these females in developing countries have increased morbidity and mortality. Any reduction in the number of infected females has the potential to positively affect the females, their children and potential partners.

The WHO (1994) advocates the use of interventions that encourage students, particularly at early ages, not to have sexual intercourse. Delaying sex until an older age usually results in more mature decisions about contraception and protected sex. The WHO maintains that discussing reasons for delaying sexual intercourse and strategies to

resist pressures for unwanted sex, including assertive communication skills, should be incorporated into intervention targeting young students (WHO, 1994). The intervention used in this study incorporated these elements.

The study has the potential to fill knowledge gaps. Several investigators have found school-based HIV prevention programs to be effective in increasing knowledge about HIV prevention, changing attitudes towards HIV behaviors, delaying onset of intercourse and increasing condom use among sexually active students in developed countries (Holtgrave et al., 1995; Kim et al., 1997; Kirby, Short, Collins, Rugg, & Kolbe, 1994). Similar successes in delaying sexual intercourse, increasing condom use and reducing the number of sexual partners have been documented in interventions implemented in sub-Saharan Africa (Klepp, Ndeki, Leshaburi, Hannan, & Lyimo, 1997; Kuhn & Steinberg; Mi Kim, Kols, Nyakauru, Marangwanda, & Chinatamoto, 2001). In Cameroon peer led interventions have been found to be successful in increasing knowledge and condom use in 12-22 year olds (Speizer, Tambashe, & Tegang, 2001; Van Rossem & Meekers, 2000) However, little is known about strategies that can postpone sexual activity in Cameroonian preadolescents 10-12 years of age.

This study has potential implications for young people in Cameroon, health care providers in the region, researchers, and policy makers. In Cameroon, preventing even a few people from becoming infected at early ages protects the young people themselves, their future partners and their future children from contracting the costly, deadly, and incurable disease. To researchers, the study fills knowledge gaps that exist in the literature and raises more questions for investigation. To policy makers, findings of this

study and others in this line of work can provide support for policy decisions on the type of interventions that need to be implemented in schools to control infections.

In summary, the current study provides a basis for further studies, in this area of knowledge, in other age groups, and in other parts of the international community. This line of research tests interventions that may assist in preventing HIV infections, related suffering, and death to a large segment of the young population. Also, results from this study and related studies have the potential of providing Cameroonian public health care providers with a scientifically based approach to HIV prevention interventions aimed at preadolescent females. If these strategies are successful, they can potentially save lives, avert human suffering, and reduce financial costs associated with the disease.

Chapter 2

Review of Related Literature

From the early 1980s to date, considerable research has been conducted in the area of HIV prevention. Much of the early literature focused on identifying risk groups and methods of disease transmission. The published work in this area has broadened immensely to involve the testing of comprehensive, multi-sectored interventions to prevent the disease. In the review presented here, the focus is on HIV prevention studies conducted in sub-Saharan Africa among adolescents and preadolescents. Several studies conducted in developed countries that are deemed relevant to this study are also included.

Little is known about the role of interventions directed at preadolescent girls in Cameroon. To provide a background for the study, relevant research has been grouped into prevalence studies, descriptive studies, and intervention studies. Prevalence studies are largely population-based surveillance studies that focus on the incidence, prevalence, trends, and groups at risk. Of particular interest are those studies analyzing rates of HIV infections in sub-Saharan Africa. Descriptive studies tend to focus on risk factors, barriers to transmission and enhancers to transmission of the disease in samples of populations. Intervention studies test strategies to modify behaviors that increase the risk for infection or on mediators to these behaviors. In the section describing intervention studies, research explaining the role of the three dependent variables (Abstinence negotiation skill, intentions to delay the initiation of sexual activity and actual sexual

activity) is included. This section is followed by a summary of strengths and of studies reviewed. Lastly a review of the theoretical framework for the study is presented.

Prevalence of HIV

AIDS is now the leading cause of death in sub-Saharan Africa (WHO, 2003). The progression of the spread of disease has outpaced all projections that were made in earlier decades. For example in 1991 the WHO projected that there would be 9 million infected individuals and nearly 5 million cumulative deaths in Africa. In 2000 the reality of HIV infection was more than three times that estimate, with 34.3 million infected persons and 18.8 cumulative deaths (WHO, 2001). As the rate of HIV infections in the general population increases, the old patterns of sexual risk behaviors result in more new infection simply because the chance of encountering an infected partner becomes higher.

Globally, young people between the ages of 10 and 24 account for more than 50% of new HIV post-infancy infections annually. The same age group constitutes about 30% of the population of countries in sub-Saharan Africa. The sexual behaviors of these young people will determine the course of the epidemic for decades to come. If effective preventative strategies for HIV are not developed, sub-Saharan Africa will continue to bear staggering human and economic costs that are associated with the disease (Piot, Bartos, Ghys, Walker, & Schwartlander, 2001).

The HIV infection rates in young African women are far higher than those in young men. In a three-year longitudinal, population-based studies of 11 sub-Saharan countries conducted by the UNAIDS, the average HIV infection rates for adolescent girls was over five times higher than that of adolescent boys. The peak rate of infections also occurred earlier in females than in males (UNAIDS, 2003). The high prevalence rate of

HIV infections found in this study ranged from about 1% to 23% among adolescent females, aged 15-19. These surprisingly high rates of infections, point to a need of preventative interventions targeting females in this age group and even younger girls (Laga et al., 2001).

Age of Initiation of Sexual Activity

The actual age of initiation of sexual activity in Cameroon is not clearly documented. The earliest information available that describes initiation of sexual activity in Cameroon was a 1991 WHO survey. This survey reported that the median age of first sexual activity for Cameroonians surveyed in the 20-24-age range was 16.1 years (UNAIDS, 2000). No further details were reported. A more recent descriptive study conducted among Cameroonian youth revealed that by age fourteen, 20% of the females participating in the study reported that they had already had sexual intercourse. Further evidence of early initiation of sexual activity can be gleaned from HIV prevalence data. WHO age specific prevalence data for 1999, presented earlier, show an alarming tenfold rise in HIV prevalence from age 10 to age 20. These alarming statistics point to the need for interventions targeting pre-adolescent students in developing countries to assist them in acquiring skills that can be used for safer sex behaviors as they enter their adolescent years.

In addition, the need for early interventions is supported by UNAIDS studies that have been conducted in other Sub-Saharan countries. UNAIDS reported that in poor populations, the age of initiation of approximately 10% of the preadolescent population in sub-Saharan Africa may be 11 or younger. In one survey conducted among children and adolescents in Zambia, over one quarter of the children aged 10 in poor areas of the

capital city had already had sex. In addition, the figure rose to 60% among 14 year olds (Laga et al., 2001).

Summary and Critique

A large number of prevalence and incidence studies have been conducted over the years in sub-Saharan Africa. These studies paint a grim picture for the future of the region if the rates of HIV infections are allowed to continue to rise uncurbed. They also provide insights into groups at risk and behaviors that put them at risk. For example young females are clearly a group at risk. The factors that put them at risk include early initiation of sexual activity compounded by the lack of economic resources.

However there are gaps in the available information. Routine HIV screening is not done in the general population in the sub-Saharan Africa and the data are based on cohorts of some populations. Available findings from studies of subsets of the population may not be applicable to the population as a whole. The reports often do not include enough details on sampling techniques and analysis methods. Frequently, only percentages and means are reported. Details on study methods such as sampling, analysis, as well as specific findings including standard deviations would be helpful to the reader in understanding and interpreting the reported findings. In spite of these deficits, the surveillance data provides compelling evidence that the incidence of HIV infections in sub-Saharan Africa is growing at alarming rates. In addition, the prevalence rate is higher in young females compared to young males.

Descriptive Studies

In addition to the prevalence studies described earlier, a number of researchers have examined risk factors related to HIV transmission in adolescents and preadolescents

in sub-Saharan Africa. Many of these researchers have focused on knowledge and perception of susceptibility to HIV infection, factors contributing to the early initiation of sexual activity, and factors that enhance or impede the spread of the disease.

Knowledge of HIV/AIDS

Ignorance and misconceptions contribute to the spread of HIV infections in sub-Saharan Africa. In general, most people around the world have some understanding of strategies to prevent HIV infections. However, there are some areas in which ignorance and misinformation continue to prosper. In a recent study conducted in Carletonville, South Africa, a third of the respondents were mistakenly convinced that all HIV-positive people would show signs of their infection (Auvert et al., 2001). In another study in Sierra Leone with a population of 13-year-old adolescents, half of the subjects believed in the existence of a vaccine for AIDS, one third believed that only people with symptoms of AIDS could transmit the virus, and more than one quarter did not know that an infected woman could transmit the virus to her unborn child (Rickter, Strack, Vincent, Barnes, & Rao, 1997). It is noteworthy that factual knowledge about HIV does not necessarily translate to safer behaviors. Accurate knowledge about the disease, however, is an essential starting point for any effective prevention strategy. In general, survey studies have concluded that knowledge about transmission of HIV in sub-Saharan Africa is variable and seems to be related to gender, socioeconomic and education status (Campbell, 1997).

Formal education has been identified as an asset when it comes to protection against HIV. The role of education is evident in an analysis conducted by UNAIDS (2000) on the results of data collected from 15 to 19 year olds in 17 African countries and

four Latin American countries. They found that as the level of education increased some kinds of risky behaviors decreased in frequency. Better-educated girls tended to initiate sexual activity later than less educated girls. Better-educated girls also reported higher condom use in casual sex compared to their counterparts who had less education. The UNAIDS advanced several reasons for the link between better education and safer sexual behaviors. Better-educated people usually have more access to information than the illiterate or uneducated, and they are more likely to make well-informed decisions. In addition, educated people generally have better paying jobs and greater access to money and resources that can help to support healthier lifestyles (UNAIDS, 2003).

Developmental Factors

Adolescence is a period of sexual experimentation during which the risk of adverse health outcomes associated with sexual activity increases. The adolescent population is considered to be in jeopardy because adolescents generally tend to underestimate their risks, miscalculate their vulnerability, and feel impervious to negative outcomes (Redman, 1998). Adolescents are also initiating sexual activity at an earlier age than previous decades, and often without condom use (Caceres, Rosasco, Mandel, & Hearst, 1994).

In Cameroon as in many sub-Saharan African countries, different ethnic groups coexist with customs that have different levels of permissive sexual practices. In addition, many parents do not discuss sexuality with their children (Rwenge, 2000). In a cultural context of sexual ambiguity, the absence of sensitive and credible health education can promote sexual activity (Brooks-Gunn & Furstenberg, 1990). In Cameroon media HIV awareness campaigns have not translated into the adoption of healthy sexual behaviors

(Rwenge, 2000). Searching for effective, structured primary prevention strategies that target preadolescents before they begin initiating sexual activity remains a necessity.

Predictors of Sexual Behaviors

Miller, Norton, Fan, and Christopherson (1998) argued that two overarching perspectives are often used as the conceptual basis for explaining adolescent sexuality. The first views sexuality as a biological unfolding and the second views sexuality as socially and environmentally shaped (Urdry & Billy 1987). In early adolescence, however, studies indicate that social domain factors such as intentions to delay the initiation of sexual activity and communication skills are the most powerful predictors of engaging in sexual behaviors (Flannery, Rowe, & Gulley, 1993; Miller et al., 1998).

Age of Initiation of Sexual activity and Enabling Factors

Several investigators have focused on age of initiation of intercourse in sub-Saharan Africa and have also explored common enabling factors. For example, Lahai-Momoh and Ross (1997) conducted a survey in Sierra Leone among 2nd to 10th grade students to determine the age of initiation of sexual activity and condom use. They found that many students reported that had engaged in sexual intercourse for the first time by age 16. These researchers also found that reported condom use was related to factors such as age, knowledge about HIV, and anxiety related to possible infection. Similar results have been obtained in East African countries. In Uganda, Byabamazima et al. (1996) found that by age 16 the majority of Ugandan youth had already had sexual intercourse. The investigators studied adolescents in five districts of the country between the ages of 12 and 20 using a cross-sectional survey. In this study, the most common enabling factors for initiation of sexual intercourse were identified as trans-night dances (dances

that last all night), alcohol consumption, weddings, funeral rites ceremonies and early teen marriages. These researchers hypothesized that the lack of direct parental supervision during most of these social events provided an environment that was conducive for sexual experimentation.

The early age of initiation of sexual activity has also been documented among Cameroonian youth in the only descriptive study located that focused adolescents in English speaking provinces of Cameroon. Rwenge (2000), in a study of 671 youth, aged 12 to 25, found that nearly half of the participants indicated that they had had sexual intercourse by age 16. The main reasons given for early initiation of sexual activity were curiosity and influence of peers. This supports the need for intervention in early adolescents in which health care providers can assist youth in augmenting their understanding of the consequences of risky sexual behaviors, thereby reducing these risky behaviors.

Role of Cultural Practices

A number of researchers have focused on the role of cultural practices that increase risks for exposure. Sallar and Azoh (1998) conducted in depth interviews with 20 adolescents aged 14 to 18 in Ghana to ascertain the possible barriers to the implementation of successful HIV prevention programs. These researchers found that while knowledge was high in general, none of these adolescents consistently practiced safer sex behaviors. Lack of accessibility and affordability of condoms, partners' refusal to use condoms, lack of condom use skills, and the cultural symbolic recognition of manhood and womanhood arising from the birth of a child emerged as barrier to adopting safer sexual practices. Byabamazima et al. (1996) conducted a similar descriptive study

designed to understand factors facilitating the initiation of sexual relationships in adolescents in Uganda. These researchers found that most first relationships occurred between 14 to 16 years of age. Cultural enabling factors included: Trans-night dances, alcohol consumption, early teenage marriages, consensual or non-consensual sexual relationships with school teachers, and unsanitary practices of traditional healers such as cutting with used and dirty blades (Byabamazima, et al., 1996; Sallar & Azoh, 1998).

On the other hand, some cultural beliefs and practices were also found to be associated with reduced risk for HIV infections. These include restrictive cultural norms, religious commitments, and delayed age of initiation of sexual activity in some cultures (Nicholas & Durrheim, 1995). Nicholas and Durrheim (1995) investigated the relationship between religiosity, sexuality, and AIDS related behaviors. A total of 1,807 black students in South Africa participated in the study. The researchers found that religious commitment and belonging to a cultural group that had restrictive cultural norms diminished the propensity to engage in sexual intercourse and delay the onset of sexual intercourse. To be effective, intervention strategies must incorporate cultural elements that can influence sexual behaviors because of the central role that culture plays in sexual behavior (Sallar & Azoh, 1998; UNAIDS, 2003).

Other Contributing Factors

The factors that contribute to the continuous spread of HIV in sub-Saharan Africa are numerous and often intricately related. Fear, stigma and denial have been identified as one group of interrelated factors that fuel the epidemic in sub-Saharan Africa (Piot et al., 2001; UNAIDS, 2000). The behaviors that spread HIV take place in private. There is a lag time of months to years between infection and any visible signs of illness.

Furthermore, HIV does not in itself cause a single specific fatal disease. Instead HIV compromises the immune system of infected persons. Thus the direct cause of death can be due to a long list of opportunistic infections that look like many common illnesses in the region. All of these factors make it easy for those who do not want to accept the reality of AIDS to question surveillance data. Denial increases vulnerability to the silent spread of the disease. In many places including Cameroon, many ordinary citizens are reluctant to acknowledge the relevance of AIDS to their own lives because of the stigma and shame associated with this fatal disease (Musa, 1998).

Descriptive Studies in Cameroon

Several researchers have examined the factors that predispose preadolescents and adolescents to the risk of HIV infections in Cameroon. The majority of these researchers have focused on the socio-cultural context of HIV transmission. They found that many adolescents and young adults engage in premarital relationships (Meekers & Calves, 1997; Musa, 1998; Rwenge, 2000; UNAIDS, 2000). The complex nature of these sexual relationships is also evident. While females are often involved in such relationships with older males, their male counterparts often initiate sexual activities with their age mates or females that are younger (Meekers & Calves, 1997; UNAIDS, 2000). In addition, many females engage in these sexual relationships for economic benefits. Some contextual factors contribute to the general lower socio-economic status of women. In Cameroon men are more likely to complete high school, attend colleges and subsequently get better paying jobs than women. Women also tend to get married at younger ages than men. In addition, cultural norms dictate that the man is the head of the household and the decision-maker. All these factors translate to a subordinate role for women and economic

dependence of many females on their husband or partners (Meekers & Calves, 1997; Rwenge, 2000; UNAIDS, 2003).

Some researchers found that ethnic background, household structure, and family income, are risk factors in early initiation of sexual intercourse and HIV prevention practices (Meekers & Calves, 1997; Rwenge, 2000). Rwenge (2000) found high levels of early initiation of sexual activity in preadolescents and adolescents belonging to certain ethnic groups in the Northwest province in Cameroon when compared to other geographical regions. Such behaviors have been hypothesized to reflect ethnic customs that have norms permitting premarital and extra marital sexual behaviors (Rwenge, 2000). Adolescents living in poverty, and adolescents living with a single parent, or with relatives, were more likely to engage in sexual activity than those who lived with their parents or in more affluent homes (Rwenge, 2000). Based on this finding, Rwenge suggested that youths in poorer homes were at risk of attempting to satisfy their material needs through gifts or financial help from sexual partners (Rwenge, 2000). In another study conducted in Cameroon, examining the types of sexual relationships among men and women, Meekers and Calves(1997) reported that the culture in many parts of Cameroon supported multiple sexual relationships in the form of polygamy and men often had main girlfriends/fiancés and other casual sexual partners at the same time. These researchers also reported that socioeconomic status of some females played a role in their participation in casual relationships (Meekers & Calves, 1997).

Other researchers examined the association between HIV infection and other sexually transmitted diseases in sexually active women attending clinics for treatment in Cameroon (Suligoi et al., 2001). They found that syphilis and herpes simplex type 2

infections are closely linked to HIV infections in Cameroonian adolescents and young adults. These researchers concluded that syphilis represented a marker for at-risk sexual behavior and is a co-factor for HIV transmission in Cameroon (Suligoi et al., 2001).

Similar results were found by researchers who examined sexually active South African women visiting a clinic for syphilis treatment (Auvert et al., 2001)

Summary and Critique

In general the descriptive studies provide more information than prevalence studies on the types of samples used and the results obtained. Researchers examined factors that acted as enhancers or barriers to transmission of HIV, the groups at risk and risk factors. For example young females are put at risk when they initiate unprotected sexual intercourse early, with older, more experienced men, because their immature genitals are more prone to tears. These behaviors in young females are fueled by ignorance about HIV transmission, lack of education, lack of economic resources and a culture that does not frown on age mixing. The role of culture and socioeconomic factors in the transmission of HIV infection is very apparent in these studies. Culture can contribute either to increasing the spreading of HIV infections or to controlling the spread depending on acceptable norms. People living in poverty often participate in sexual risk taking behaviors such as early initiation of sexual activity than those that are wealthier.

One of the limitations of these descriptive studies was the lack of illumination of differences in sexual practices among preadolescents, early adolescents, late adolescents, and young adults. Samples used in these studies usually had a wide age range of 10 to 25 and data were frequently reported on the whole sample. In addition most of the studies involved convenience samples and relied solely on self-report data.

In all, relatively very few descriptive studies have been conducted in Cameroon. Only two descriptive studies (Meekers & Calves, 1997; Rwenge, 2000) were found in which the researcher focused on Cameroonian adolescents, and examined factors related to early initiation of sexual activity and predictors of sexual behaviors. Other researchers examined groups that were older, already sexually active, or using clinics for sexually transmitted diseases (Suligoï et al., 2001).

These studies provide insights into the complex nature of sexual behaviors in young women that lead to HIV infections. In order to reduce the number of infected cases in those at risk, studies that evaluate interventions aimed at increasing safe sex behaviors in young females remain a necessity.

Intervention studies

Since the beginning of the HIV pandemic, a large volume of intervention studies have been conducted in the area of primary prevention. The majority of these studies have been conducted in developed countries. This review begins with a brief overview of some effective HIV prevention studies at a global level, in the general population, but will focus on intervention studies conducted in sub-Saharan Africa. As such these studies are discussed in more detail at the end of this section. Studies conducted in the developed world are included where they shed more light on the current knowledge and practices in behavioral interventions related to HIV. In addition, while studies have been conducted to test interventions in other target populations in sub-Saharan Africa, only interventions relevant to school based interventions, preadolescents and adolescents will be examined in depth.

HIV Prevention Intervention Studies in the General Population

Numerous HIV prevention studies have been conducted in different countries around the world. These studies target different risk groups such as men having sex with men, prostitutes, intra-venous drug users and adolescents. Most interventions focus on assisting people to adopt risk reduction behavior such as increasing condom use (e.g. Jemmott, Jemmott, & Villaruel, 2002; Stanton, Ricardo, Galbraith, Feigelman, & Kaljee, 1996; Walter & Vaughan, 1993), reducing the number of sexual partners (e.g. Jemmott, Brown, & Dodds, 1998; St. Lawrence, Brassfield, & Jefferson, 1995), and needle exchange programs for drug users (e.g. Montessoro, 2000).

Many of these intervention studies have also been conducted among adolescents. Kim et al. (1997) conducted a review of the effectiveness of forty AIDS risk reduction interventions and found that 88% of these studies assessed changes in knowledge, 58% assessed changes in attitudes, 60% assessed changes in intentions to use condoms, 73% assessed condom use, and 64% assessed decreasing sexual partners. Other studies have implemented interventions that are more culturally specific to different ethnic groups such as African Americans (Jemmott & Jemmott 1991; Jemmott et al., 2002), Latinos (Caceres et al., 1994) and Asian/Pacific Islanders (Cochran, Mays, & Leung, 1991; Su-I & Basen-Enquist, 1997). Gender sensitive interventions have also been tested by some researchers and have been found to be more effective than interventions that are not gender specific (e.g. Jemmott & Jemmott, 1992; Mallory & Fife, 1999; Nyamathi, Bennett, & Leake, 1995).

Safer Sexual Practices

Health care professionals promote consistent and correct use of condoms as an effective means to prevent HIV transmission. Evidence supports the consistent and correct use of condoms as an effective strategy that can limit the spread of the disease (Hart et al., 1999; Padian, Shiboski, Glass, & Vittinghoff, 1997). In line with this recommendation, numerous researchers have tested strategies to increase consistent condom use among different populations. For example Jemmott et al. (2002) designed a randomized control trial to increase condom use among Latino college students. The intervention based on the Theory of Planned Behavior was successful in increasing consistent condom use.

Another randomized controlled trial conducted by Jemmott et al. (1998) used the same theoretical perspective with African American preadolescents and adolescents. The mean age of participants in this study was 11.8 years and they were followed for 12 months after the intervention. The safer sex intervention group received information on abstinence but the emphasis was on using condoms if they have sex to reduce risk of pregnancy and HIV infections. The intervention was also designed to increase condom use skills and self-efficacy beliefs about condom use. These researchers used Likert scales with item ranked from 1-5, to assess participants 12 months post intervention and found that participants in the intervention group reported less sexual intercourse (1.34 vs. 3.77, $p < 0.01$) and less unprotected sex (.04 vs. 1.85, $p < 0.001$) than did the control group.

Treating Other Sexually Transmitted Diseases (STDs)

The WHO has recommended programs to improve the management of bacterial STDs as effective strategies to control the spread of HIV infections (2000). The organization goes further to suggest that treatment of bacterial STDs might be one of the most effective means of controlling HIV infection in many developing countries (WHO, 2001).

Treating STDs has been demonstrated as an effective strategy in controlling the spread of HIV infection in some studies. For example, Shain et al. (1999) conducted a randomized trial of a behavioral intervention to prevent STDs in minority women (African American and Hispanic). A total of 616 participated in the 12 month-long study. The intervention consisted of three small-group sessions lasting 3-4 hours each designed to help participants recognize susceptibility, commit to changing behavior, and acquire necessary skills for sexual behavior change. After the entire twelve months, rates of subsequent infection in the intervention group were significantly lower than in the control group (16.8% vs. 26.9%, $p = .0004$).

In a similar study, Grosskurth, Mosha, and Todd (1995) conducted a randomized control trial in Tanzania in which six thousand individuals between the ages of 15-54 were followed for two years. The intervention consisted of the establishment of an STD reference clinic, staff training, regular supply of drugs, regular visits to health clinics and health education about STDs. The intervention reduced the risk for HIV infection by an estimated 0.58 % risk ratio ($p=0.007$). These researchers concluded that the improvement of STD treatment reduced the incidence by about 40 % in the study population.

In one study, however, researchers failed to find sustained effects 9 months after the intervention. Boekeloo et al. (1999), conducted a brief trial among adolescents aged 12-15. The intervention consisted of an audio taped risk assessment and education about staying safe (condom use and abstinence) during a doctor's visit. While there were fewer reports of sexual activity in the intervention group at three months post intervention. These gains were not sustained at the 9-month follow up assessment.

School-based Interventions

Setting for HIV prevention interventions

The school system is a logical vehicle for the delivery of large-scale HIV prevention programs targeting students before adolescence. In terms of organizational capacities, no other single delivery system equals the same magnitude of teaching pre-teenagers about their health. In developed countries, schools have served as the setting for a number of effective large scale preventive interventions addressing a variety of risk behaviors including behaviors that lead to HIV infections (Walter & Vaughan, 1993). Very few school-based interventions, however, have been carried out in sub-Saharan Africa, where the need is greatest.

In numerous recent studies, researchers have found that school-based HIV/AIDS education is an effective strategy in increasing students' knowledge about HIV, changing attitudes towards risk behaviors, delaying onset of sexual intercourse, and increasing condom use among sexually active students (e.g. Holtgrave et al., 1995; Kim et al., 1997; Kirby et al., 1994; Newman, Durant, Ashworth, & Gaillard, 1993). Programs with theoretical grounding in social learning or behavioral science theories seem to be the most effective in changing behaviors (Kim et al., 1997; Kirby et al., 1994). However the

majority of these studies have been conducted among older adolescents in middle or high school, in industrialized countries (Klepp et al., 1997). Only a relatively few number of these studies have been conducted in developing countries where the students are at a greater risk for contracting HIV than those in developed countries (Fitzgerald et al., 1999). The few studies conducted in Cameroon have also been conducted among older adolescents ages 15-19 and have not been school-based (e.g. Speizer et al., 2001; Van Rossem & Meekers, 2000) There is a need for primary prevention studies that target preadolescents in developing countries before they become sexually active.

Content of School Based Interventions

Whether abstinence or safer sex should be the focus of HIV intervention efforts in schools has been vigorously debated by public health experts, educators, parents, and other advocates for youths (Jemmott et al., 1998) Results on the efficacy of abstinence interventions have been mixed. Early studies that found significant effect with abstinence promotion interventions were not randomized controlled trials (Howard & McCabe, 1990; Young, Core-Gebhart, & Marx, 1992). For example, Howard and McCabe (1990) tested an experiential based program to postpone sexual involvement among eighth grade students (13-14 years old). The program intervention was added to an existing sexuality education program in 19 separate schools in California. The program was found to be particularly beneficial to students who had not initiated sexual activity. By the end of eighth grade, students who had not been part of the program were 15 times more likely to have begun sexual activity than those who were in the program. In addition, by the end of ninth grade, 27% of those who did not participate had initiated sexual activity compared to 17% of students in the program. Although entire classrooms were units of assignment

to intervention or control groups, the analysis of the data was done at the individual student level.

Other researchers have found that abstinence interventions did not reduce risky sexual behaviors (Kirby, Barth, Leland, & Fetro, 1991; St. Pierre, Mark, Katreider, & Aikin, 1995). For example, Kirby et al. (1991) evaluated a cognitive behavioral theory based curriculum implemented in 13 high schools in California using a quasi-experimental design. At the end of 18 months no statistical differences were found between participants and those in control groups. Study variables included frequency of intercourse during the previous month and contraceptive use. In this study, the unit of random assignment to either experimental or comparison group was entire classrooms, although the analysis was conducted at the individual student level.

In a number of recent experimental studies that have included preadolescents and early adolescents, interventions have shown a positive effect on increasing intention to delay sexual activity. In a study focusing on increasing communication with parents through five-homework assignments, Blake, Simkin, Ledsy, Perkins, and Calabrese (2001) found an increase in reported high-risk behavior avoidance skills such as intentions to postpone sexual activity until completion of high school, and improve parent–student communication in middle school students. They employed a randomized design, with an intervention focusing on improving parent-child communication and preventing early onset of sexual behavior. Base on the ANCOVA analysis with baseline score as covariates they found that adolescents who received the curriculum reported significantly greater self-efficacy for refusing high-risk behaviors than those in the comparison group (mean score, 16.8 vs. 15.8). The students also reported lower intentions to have sex

before finishing high school (.4 vs. .5), more frequent parental communication about prevention (1.6 vs. 1.0), and consequences (1.6 vs. 1.1).

In another randomized controlled trial conducted among 11 to 19 year old inner city youths, Jemmott et al. (1998) demonstrated that the abstinence approach was effective in delaying the onset of sexual activity and reducing the number of sexual partners, in the short term with the effect diminishing in long-term follow-up (Jemmott et al., 1998). The abstinence intervention discussed condoms use as a strategy to reduce risk but emphasized abstinence to eliminate the risk of pregnancy and AIDS. The intervention was designed to: 1) Increase knowledge of HIV and STDs, 2) Strengthen behavioral beliefs supporting abstinence, including the belief that abstinence prevents pregnancy, STDs and HIV, and beliefs that abstinence can foster attainment of future goals, 3) increase ability to resist pressure to have sexual intercourse and ability to negotiate abstinence. They found that among sexually inexperienced students, those in the abstinence intervention group were significantly less likely to report having sexual intercourse at the three-month follow-up than their counterparts (odds ratio (OR), .26; 95% CI, .08-.83).

The inconsistent findings in early studies focusing on abstinence promotion led many to argue that ‘abstinence only’ interventions had not demonstrated successful outcome with regards to delaying the initiation of sexual activity (Alan Guttmacher Institute, 1994). Today, it is generally agreed that programs that encourage abstinence as the best approach for HIV prevention in adolescents and include comprehensive approach, in which other safer sex practices are discussed, are more successful than programs that focus only on abstinence (American Academy of Pediatrics, 2001; Kirby et

al., 1997; Landry, Kaiser, & Richards, 1999). The American Academy of Pediatrics recommends that comprehensive abstinence promotion interventions be used because they have been shown to delay the initiation of sexual activity and increase safer sexual behaviors among sexually active adolescents (American Academy of Pediatrics, 2001). This approach was therefore chosen for this study to test its effectiveness in sub-Saharan Africa.

Format of Interventions

The formats of delivery of interventions to promote healthy sexual behaviors are varied. Increased duration of the intervention and use of social cognitive theory as a basis for school-based interventions have been associated with improved outcomes (Kim et al., 1997). For example, based on a review of HIV prevention intervention studies Kim et al. (1997) concluded that programs that were effective tended to be two to three times longer in duration than those that were not found to be effective in changing behaviors. However, the Center for Disease Control and Prevention (CDC) has also identified brief interventions such as the “Be Proud! Be Responsible!” program developed by Jemmott, Jemmott, and McCaffee (1996) that have been effective (CDC, 2001).

Initially, some researchers reported that the use of peers to implement HIV prevention programs in the adolescent population was more effective than the use of adults, (Howard & McCabe, 1990; Rickert, Jay, & Gottlieb, 1991). However subsequent studies provide support for adult-led programs (St. Lawrence et al., 1995; Walter & Vaughan, 1993). In all, the effectiveness of a specific format depends on both the target population and the desired behavioral outcomes.

Summary and Critique

Numerous school-based studies have been conducted at a global level. Schools are particularly suitable settings for large-scale interventions promoting healthy behavior because the system has the potential to reach large number of students who are already in a learning environment. Several lessons can be learned from the contents of effective school based intervention in both developed and developing countries. Coping skills or negotiation and communication skills, community/cultural issues, and developmental issues have surfaced as important components of effective programs (Holtgrave et al., 1995; WHO, 2001). In addition to these factors, studies that are based on social psychological theories and have rigorous designs have also been more effective than those that do not have a theoretical basis. Furthermore the format of delivery of the interventions used in effective studies is varied. Studies using peer-led and adult-led interventions have been found to be effective. Also, studies of different durations (longitudinal and brief interventions) have all been effective indicating that the appropriateness of a given format may depend on the population studied and the desired outcome.

However, most researchers have focused on older adolescents. The outcome variable was frequently condom use with few randomized studies examining the delay of sexual activity or abstinence. Also, in many school-based interventions, including randomized trials was the lack of congruence between units of random assignment and units of analysis.

Target Age for Interventions

According to the Piagetian schema of cognitive development widely, children between 7 to 11 years old are in the concrete phase of thinking (Dacey & Tavers, 2003). With this in mind, it can be argued that the lack of mastery of formal operations may contribute to unsuccessful outcomes in interventions targeting the adoption of healthy behaviors in among children in this age range. In designing interventions for this age group, concrete, real live examples and a participatory approach to implementing interventions is recommended by the Centers for Disease Control and Prevention (CDC, 2001) and the WHO (1994) to accommodate the level of cognitive development. This recommendation will be followed in the current study.

Furthermore, according to the WHO (1994), there is no single best target age for school- based interventions in all settings. Programs on HIV prevention and sexuality are more effective if implemented before the onset of sexual activity (WHO, 1994). This recommendation means that for some settings, interventions need to be started at early school grades. The WHO further argues that information on age at first intercourse is the single best indicator of the appropriate target age for HIV prevention interventions in a given setting. Data presented earlier in this review indicated that, in 25% of Cameroonian youth, sexual activity is initiated by the ages of 10 and 14. Following the recommendation from the WHO, to start a prevention intervention before the initiation of sexual activity, the 10-12-age range appears to be the best target range for interventions in Cameroonian youth. This finding from the review of literature provides the rationale for focusing on this age group for the current study.

This age group is particularly appropriate when one considers the increased likelihood of infection during the first intercourse in females. Females are more likely to initiate sexual activities with partners who are older men and more sexually experienced men (Boerma, Urassa, Klokke, Senkoro, & Ngweshemi, 1999). In Cameroon, this age mixing in sexual relationships increases the chance that a young preadolescent female will encounter an already infected partner. It is hypothesized that acts of sex in which vaginal or cervical trauma and bleeding are common, such as in forced sex or during the loss of virginity, increase the risk of contracting HIV infection in young females (Laga et al., 2001). All these factors point to the crucial need to target young females before they become sexually active and to test interventions that might assist them in protecting themselves.

Outcome Variables

Sexual Abstinence Behavior Skills

Abstinence behavior skills have not been investigated as a primary variable in many studies. Numerous researchers included this variable in intervention studies that targeted subjects that had not initiated sexual activity (Fitzgerald et al., 1999; Jemmott et al., 1998; Klepp et al., 1997; Walter & Vaughan, 1993). Developing interpersonal skills that help students avoid, cope with or leave risky sexual situations has been identified as an essential component of HIV prevention interventions (Holtgrave et al., 1995).

Negotiation skills have been studied extensively in older populations but such studies are lacking among preadolescent populations. Numerous researchers have examined negotiation skills related to condom use in sexual relationships. This variable has been studied both as a predictor of actual condom use or as an outcome of an

intervention (Godin & Kok, 1996; Holtgrave et al., 1995; Jemmott et al., 1998; Jemmott et al., 2000; Kim et al., 1997). In these studies, researchers found that higher negotiation skills lead to increased condom use in heterosexual sexual relationships. In addition the variable has been examined in the context of gender and power issues (Mallory & Fife, 1996; UNAIDS, 2003).

Intentions to Delay Initiation of Sexual Activity

Intentions to delay the initiation of sexual activity have not been the focus of many intervention studies. On the other hand, intentions to use condoms or to reduce the number of sexual partners have been studied extensively (e.g. Boyd & Wandersman, 1991; Godin & Kok, 1996; White, Terry, & Hogg, 1994). For example, White et al. (1994) conducted a study with 179 college freshmen and examined the relationship between intentions to use condoms during the next month and actual condom use during the same month after the intervention. They found intentions to be significantly correlated ($r = .49, P < .001$) to actual condom use. In other studies reported higher levels of intentions to use condoms led to higher levels of reported condom use in study population. Intentions to use condoms as predicted by attitudes towards condom use, social norms towards condom use and perceived control over condom use have also been the focus of some studies (e.g. Corby, Jammer, & Wolitski, 1996; Sutton, Mcvey, & Glanz, 1999; White et al., 1994). These studies suggest that positive attitudes toward condom use, social norms supporting condom use and perceived ease of use and availability of condoms enhanced intentions to use condoms.

Intervention Studies Involving sub-Saharan Preadolescents

Relatively few intervention studies were conducted in sub-Saharan Africa. Most of the intervention studies conducted have been quasi-experimental in nature and tend to focus on raising awareness, as well as knowledge about HIV prevention and condom use.

School based studies conducted in sub-Saharan Africa were effective in reducing risk factors for HIV infections. Interventions led by trained local teachers and health workers were found to positively influence AIDS knowledge, attitude, subjective norms and intentions towards having sexual intercourse (Klepp et al., 1997; Kuhn & Steinberg, 1994; Mi Kim et al., 2001). The effects of these interventions were sustained for at least one year. The age ranges of the samples in these studies were varied. In some of these studies, the samples consisted of 10-24 year olds (Mi Kim et al., 2001; Rwenge, 2000); the whole school in one study (Kuhn & Steinberg, 1994); and in another study, the sample was a primary school classrooms with an average age of 13 (Klepp et al., 1997). All these researchers included comparison or control groups but only one of the studies (Klepp et al., 1997) was a community trial that included randomization techniques. In addition there might be gender differences in responses to HIV prevention interventions. Kuhn and Steinberg (1994) found that female adolescents and preadolescents were more likely to have said no to sex, after an intervention than their male counterparts.

Intervention Studies Involving Cameroonian Adolescents

Only two relatively recent quasi-experimental studies conducted in Cameroon were found in the literature. Speizer, Tambashe, and Tegang (2001) conducted a quasi-experimental community based study using an 18-month intervention targeting sexually

experienced adolescents and young adults. A total sample of 1,620 adolescent and young adults participated. Study variables included knowledge and the practice of protective sexual behaviors. They found that subjects who had a peer educator reported more knowledge regarding contraception and sexually transmitted infections, and reported significantly higher contraceptive use than participants who did not have a peer educator.

In a similar study, Van Rossem and Meekers (2000) used a quasi-experimental pretest and posttest design with a nonequivalent comparison group to test an intervention employing social marketing strategies. The intervention had a significant effect on increasing the use of contraceptives and condom use. In this study the sample consisted of youths aged 12-22 years old. The strength of this study was the use of symptoms of sexually transmitted infections to corroborate self-report data. Based on the findings from both studies it appears that peer-led interventions were effective in increasing knowledge and condom use among the Cameroonian youths who participated (Speizer et al., 2001; Van Rossem & Meekers, 2000). No randomized controlled studies conducted in Cameroon were found. In addition, no school-based studies targeting preadolescents were located. Considering the early ages at which sexual activity is initiated among some Cameroonians, studies testing interventions that can delay the initiation of sexual activity in preadolescents and early adolescents remain a necessity.

Summary and Analysis of Literature

A large number of ongoing population based studies related to incidence and prevalence of HIV are being conducted in sub-Saharan Africa. These studies reveal a grim picture for the future of this region in terms of rising incidence of HIV infection

over the past decade. Young females have higher infection rates than their male counterparts. These studies are mostly population-based studies and specific information on how the samples are obtained is lacking. This makes the interpretation of some of these findings difficult since it is difficult to assess external validity.

A number of descriptive studies have been conducted in sub-Saharan region aimed at identifying risk groups and risk factors specific to sub-Saharan Africa. In general these descriptive studies provide some powerful insights to the complex nature of HIV risk behaviors and infection in sub-Saharan Africa. Researchers found that young females are initiating sexual activity between the ages of 10 and 16 (Rwenge, 2000; UNAIDS, 2000). Factors enhancing sexual risk behaviors are shown to be numerous and interrelated. Addressing all of these factors will require a multi-faceted national approach that cannot necessarily be addressed in a single study. However some of the behavioral factors identified (such as early initiation of sexual activity) are malleable factors that are suitable for intervention studies aimed at modifying specific risk behaviors.

There is a considerable amount of literature on school-based HIV prevention intervention studies in adolescents, which provides empirical support for the effectiveness of school based intervention programs. These studies have demonstrated the ability to increase behavioral intentions and practices to prevent HIV. However, most of these studies have been done in developed countries and in older populations. Few of these studies have been done in developing countries especially sub-Saharan Africa where infection rates are highest. The few studies conducted in sub-Saharan Africa have largely not been randomized trials.

Outcomes of school-based HIV prevention programs seem to be associated with the presence of some specific elements in the study design. Studies based on psychosocial theories, such as the Theory of Planned Behavior, Social Cognitive Theory, and Social Marketing theories are linked with many successful HIV programs. Researchers conducting studies with random samples also tend to find interventions effective and allow for clearer interpretations of findings. The inclusion of personal negotiation skills and communication skills in interventions tends to strengthen behavioral outcomes. The effective design elements gleaned for this review were incorporated into this study.

The literature surrounding the effectiveness of abstinence-based intervention is mixed. Most of the early studies did not use randomized designs and most of the studies were conducted among older adolescents. In these early studies researchers frequently did not find support for the effectiveness of interventions promoting abstinence. Recent studies provide better evidence that abstinence-promotion programs in young adolescents and in pre-adolescents in sub-Saharan Africa can be effective in preventing HIV risk behavior and delaying onset of intercourse (Blake et al., 2001; Fitzpatrick et al., 1997; Jemmott et al., 1998; Klepp et al., 1999). However, these randomized studies are limited in number and none of these studies have been implemented in Cameroon. The infection rate in Cameroon continues to increase at an alarming pace as indicated by data provided earlier. There is a need to investigate the effectiveness of theory-based interventions that can provide a scientific basis for programs that can assist preadolescents to delay sexual activity until when they are older and capable of making mature choices about safer sex strategies. These interventions are especially needed in Cameroon where there is a paucity of research in this area.

In all, literature addressing abstinence behavior skills and intentions to postpone the initiation of sexual activity in pre-adolescence is limited. In addition, the few studies that address intentions and behavior skills have not focused exclusively on these variables. There is a need for intervention programs that are developmentally appropriate for preadolescents and address cognitive and behavioral aspects that promote delaying the initiation of sexual activity.

Theoretical Framework

A growing body of evidence shows that randomized controlled trials that are based on theoretical framework can reduce HIV risk-associated sexual behavior (National Institutes of Health, 1997). In a series of HIV risk reduction studies, Jemmott et al. (1992, 1998, 2002), used this theory in designing intervention and examining the effectiveness intervention based on the Theory of Planned Behavior (Ajzen, 1988). The intervention in this study was based on the same theory in which behaviors are the results of behavior specific intentions and perception of control over the behavior. The theory was originally presented as the Theory of Reasoned Action (Fishbein & Ajzen, 1975). The theory is based on the assumption that human beings act in a sensible manner, by considering the consequences of their actions. The theory distinguishes between three broad classes of beliefs: behavioral beliefs (attitudes), normative beliefs and control beliefs. Each of these beliefs is relevant to HIV reduction interventions. Figure 2 is a diagrammatic representation of the theory.

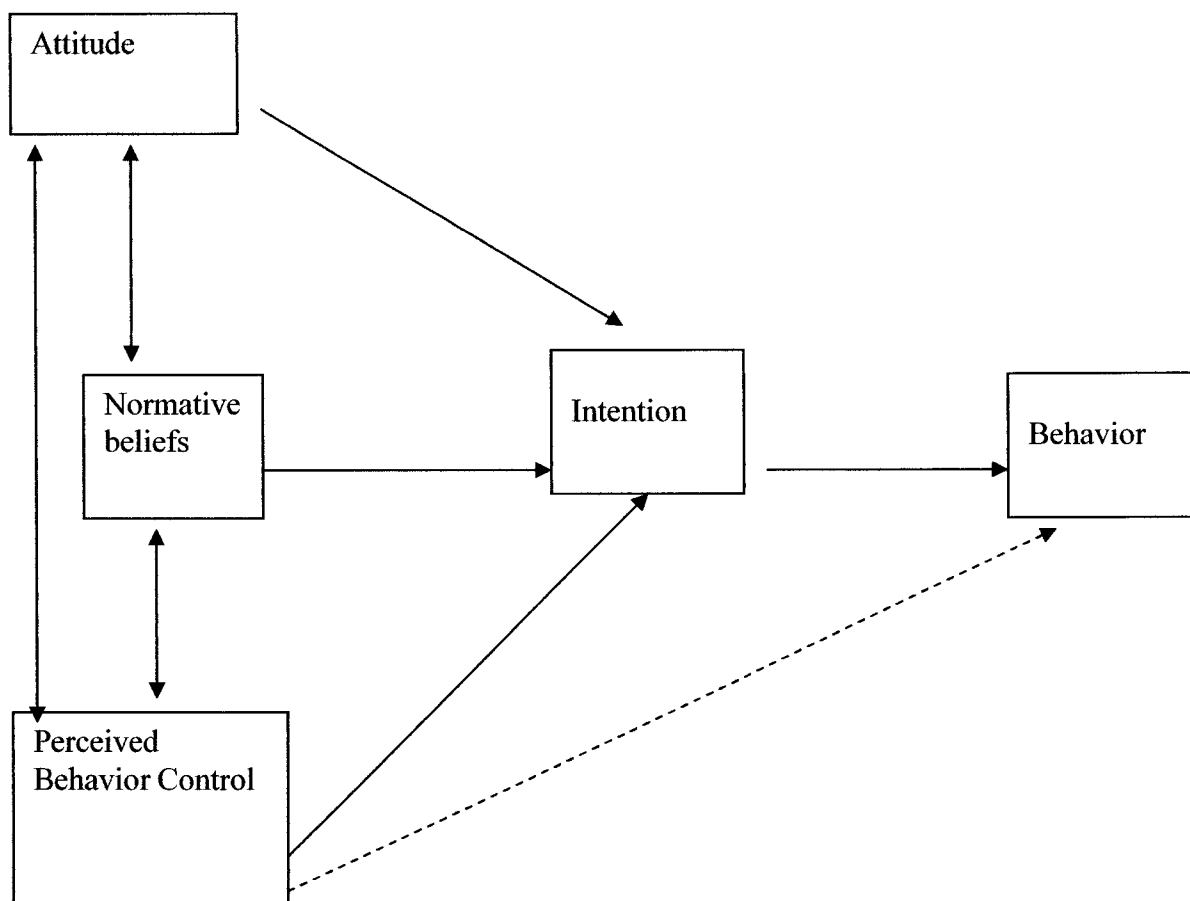


Figure 2. Diagrammatic Representation of the Theory of Planned Behavior

In this theory, behavioral intentions are an indication of how hard people are willing to try and of how much effort they are willing to expend in order to perform the behavior (Ajzen, 1988). According to this theory, an individual's behavioral intentions are a function of attitudes towards the behavior, normative beliefs, and perceived behavioral control. Based on the links proposed in this theory, the intervention in this study focuses on modifying attitudes towards delaying sexual activity, perceptions of behavioral control over delaying sexual activity, and norms towards abstinence in order to increase intentions to delay the initiation of sexual activity. In this theory intentions are

viewed as proximal determinants of behavior. Modifying intentions to delay sexual activity is therefore seen as a means of modifying the delay of sexual activity in this study. The theory also proposes a direct link from perceived behavioral control to behavior.

In addition to behavioral intentions, other concepts of this model include attitudes, subjective norms, and perceived behavioral control. Attitudes are an expression of one's positive or negative evaluations of performing a given behavior. Attitudes relevant to HIV prevention behavior include beliefs that delaying sexual activity can prevent pregnancy and sexually transmitted diseases including AIDS.

Subjective norms are personal reflections of societal expectations, especially the expectations of people considered important by an individual. In this theory the people considered important by the individual are referred to as referents. A common referent (a person whose approval is valued) for sexual practices is the person's sexual partner (Jemmott & Jemmott, 1992; Jemmott et al., 1998). Other important referents include parents, peers, and religious organizations (Jemmott et al., 2002). These subjective norms are thought to reflect both social expectations and the individual's value of the expectation.

Perceived behavioral control represents personal beliefs about obstacles, impediments, resources and opportunities that would facilitate or impede the ability to perform a given behavior. This concept reflects factors such as skills, ability, and knowledge. Impulse control belief and negotiation beliefs are associated with the use of HIV prevention strategies. Negotiation skills are linked to the perceived behavioral control concept. Skills are viewed as internal components of the perceived behavioral

control of a particular behavior (Ajzen, 1988; Godin & Kok, 1996). Based on the links proposed in the theory between perceived behavioral control, intentions, and behavior, the concept of perceived behavioral control is a major component of the intervention. The internal components of perceived behavioral control especially the acquisition of skills relevant to the behavior under consideration are of particular importance. Adequate abstinence negotiation skills are necessary for students to resist pressures to have sexual intercourse. This study therefore focuses on increasing abstinence negotiation skills to both influence intentions to delay sexual activity and to influence the actual delay of sexual activity as proposed by the theory.

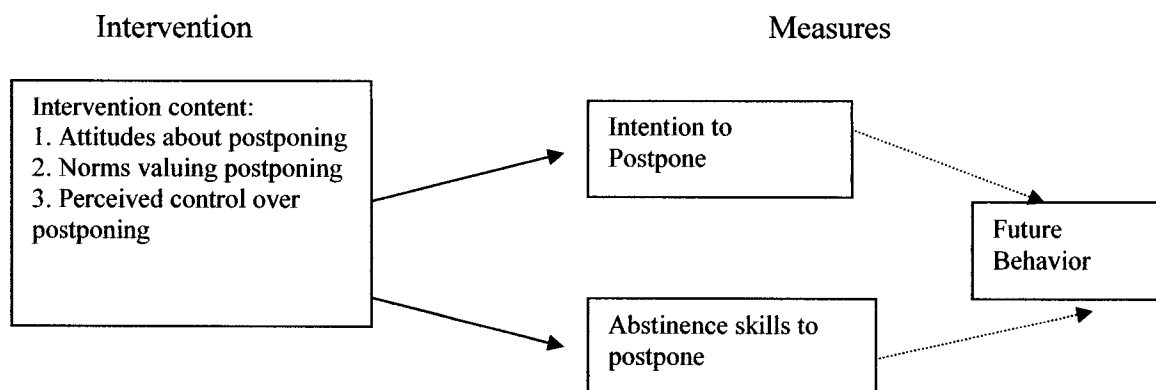


Figure 3. The Theory of Planned Behavior As Used in This Study

The TPB has been employed successfully in designing HIV prevention programs that seek to enhance the adoption of HIV prevention behaviors and positive intentions to use HIV prevention behaviors (Lavoie & Godin, 1991; St. Lawrence et al., 1995; White et al., 1994). Only one randomized trial located in the literature used this theoretical perspective to design intervention targeting primary school children in sub-Saharan

Africa (Klepp et al., 1997). One can conclude that the theory can be successfully used in pre and early adolescents in Cameroon because it has used in designing interventions that are successful in preventing HIV infection in similar populations in other regions of the world. If the intervention in this study is found to be effective, such finding would provide additional support to the usefulness of the theory in HIV prevention interventions

Chapter 3

Methods

A pretest/post test quasi-experimental design was used to address the research questions. The two research hypothesis examined two dependent variables that were directly related to the intervention. In addition the age and cultural appropriateness of the intervention was also assessed. Specifically the study hypotheses were:

In 10-12 year-old Cameroonian girls who received a school-based intervention to reduce HIV infection:

1. Intentions to postpone sexual activity will be significantly higher follow-up than at baseline
2. Sexual abstinence behavior skills will be significantly higher at follow-up than at baseline

A secondary aim of this study was to determine if the intervention procedures and instruments appropriate for the age and culture of participants.

The intervention constituted the independent variable. The intervention was based on the Theory of Planned Behavior (Ajzen, 1988), in which a specific behavior results from intentions specific to that behavior, and perceived control over that behavior. In addition, behavior specific intentions are determined by attitudes, normative beliefs and behavior control beliefs. As suggested in this theory, to influence behavioral intentions and subsequent behavior, one must address attitudes, behavior norms, and perceived behavioral control. The intervention addressed attitudes and social norms

through the use of real life scenarios that require students' responses. Perceived behavioral control was addressed by providing and discussing specific behavioral skills that can assist students in negotiating abstinence and refusing unwanted sexual advances. The research hypotheses were also based on linkages in the theory and assessed intentions and abstinence behavior, variables that are proposed to be consequences of the focus of the intervention

The intervention blended two similar and complementary curricula components. The first one used, was the "Be Proud! Be Responsible!" curriculum (Jemmott et al., 1996), which was chosen by the CDC as a model for HIV Risk reduction (Jemmott et al., 1998). The theme of delaying the initiation of sexual activity as a responsible choice for a person's future was used in this intervention. The components of this curriculum that focused on condom use were not used because they were incongruent with the focus of the study. The second component used, was *Unit 2: Responsible behavior: Delaying Sex* developed by the World Health Organization (WHO, 1994) that provided the content for the intervention. The modified curriculum, in which age-appropriate changes were made, served as the intervention for this study. The curriculum is also attached in Appendix A. The investigator used a written template of the intervention to ensure integrity of the delivery of the intervention.

Content of the Intervention

The content of the intervention included factual knowledge on HIV transmission and a presentation of abstinence as a safe method to prevent transmissions. Based on the theory of planned behavior, the intervention focused on improving attitudes, perceived behavior norms, and perceived behavioral control on delaying sexual activity, in order to

improve intentions and actual delay of sexual activity. The intervention included the acknowledgement of other risk reduction strategies such as condom use and faithfulness to one partner, in the reduction of risk for HIV. However, the intervention emphasized abstinence as the method of choice to eliminate the risk of HIV infections. The curriculum also assisted students in preparing planned responses that could be used when they were faced with pressures to have sex. The curriculum was designed to 1) Increase and strengthen intentions that support postponing sexual involvement, including the belief that abstinence can prevent HIV and foster attainment of future goals; and 2) Increase ability to resist pressure to have sexual intercourse and negotiate abstinence.

Specific content areas included:

- 1) Information on the virus, incidence in Cameroon, and modes of transmission
- 2) Methods of preventing infections from the virus
- 3) Reasons for delaying sex
- 4) Reasons why some people choose to have sex, focusing on consequences
- 5) Responding to typical lines that people use to pressure individuals to have sex
- 6) Guidelines to help students delay sex
- 7) Practice guidelines for planned responses with real life examples
- 8) Alternative ways to show affection for those who want to delay sex
- 9) Assertive communication strategies
- 10) Strategies to respond to persuasion
- 11) Dealing with threats and violence

A participatory approach was used in delivery of the intervention. Participatory strategies in the curriculum included the use of role-plays, use of real-life scenarios,

questions and answer sessions, and group discussions in the delivery of content. The primary investigator delivered the intervention.

Setting

The study took place in a large primary school in Buea, Cameroon. Cameroon is a bilingual Sub-Saharan country, made up of 10 provinces. The country has a population of about 16 million with about 46% of the population under 15. About 80% of children aged 10-14 attend schools (United Nations Children's Fund, 2000). Two of the 10 provinces are primarily English speaking while the remaining 8 are primarily French Speaking. To eliminate the need for translation of the intervention, the study was conducted in an English-speaking province. There are an estimated 400 public primary schools in these two provinces. The Ministry of National Education administers the public educational system in Cameroon. At the provincial level the Provincial Delegation of Education is the governing body that oversees the running of public schools.

Data were collected while schools were in session. The school year runs from early September to mid June. There are two short breaks in the school year. The first lasts about 10 days, from about December 22 to January 1. The second lasts about 12 days from March 14 to March 26. The instruments used in gathering data, used some terminologies that were somewhat different from those used in the educational system in the United States, to reflect terminology used in Cameroonian schools. The differences in terminologies used in the USA and Cameroonian school systems are presented in table 1, to provide a clearer understanding of the results.

Table 1

Comparison of Terminologies used in USA and Cameroonian School Systems

USA	Cameroon
Grade	Class
Elementary school	Primary school
High school	Secondary school
Grades 5 and 6	Class 6 and 7
College	University
Professional school	Technical school
Dollars (currency)	Francs CFA (currency)
Districts	Divisions

Target Population

The target population for this program of research was Cameroonian female preadolescents. At this first stage, in determining the effectiveness of an intervention, a homogeneous sample of preadolescent female students aged 10 to 12, attending the same school was used. To reduce extraneous factors, the target population had English as their primary official language, were of the same gender, same ages, and attended the same school. Preadolescent females were chosen as the focus of this study because the data presented earlier, indicated that these students were at greater risk for initiating sexual activity early, and contracting the HIV virus than their male counterparts.

Inclusion Criteria

The participants in this study were 10 to 12 year-old female students (Class 6 and class 7 students in this context) attending a large primary school in Buea, the provincial headquarters of the Southwest Province of Cameroon. The province is an English-speaking province, so translation of research intervention's protocols and tools was not necessary.

Exclusion Criteria

Students that meet the inclusion criteria were excluded if they were: 1) unable to speak, read, or understand English, 2) unable to hear spoken words; 3) arrived after the initiation of the study.

Instruments

Intentions to Postpone Sexual Activity Scale

A modified version of the Adolescent Sexual Intention Scale (Urdry & Billy, 1987) was used in this study to obtain self-reports of intentions to delay sexual activity in the next three months. The instrument, named Intentions to Postpone Sexual Activity (IPSA) consisted of three items shown in the questionnaire section of Appendix B. This scale was originally developed and used among early adolescents with a mean age of 13 (Urdry & Billy, 1987). The reliability using Cronbach alpha in the initial study was .87 with response in a Likert-type scale. Another study using this tool in a sexual behavior study among early adolescents, aged 12-14 reported a Cronbach alpha of .87 (Miller et al., 1998). Internal consistency was measured using Cronbach's (1951) alpha in this study and it was .99. All items on the IPSA were significantly correlated (from .97 to .99) to the total score at .05 alpha levels.

Prior to the implementation of this study, the content validity of the tool was assessed using a panel of 7 health educators and teachers, who work in the Cameroonian school system to review and revise the tool. The content validity was assessed using procedures outlined by Lynn (1986) on calculating a content validity index (CVI). The CVI calculated on the number of 'yes' votes on items of the IPSA were 100%. No changes were therefore needed after this review. In addition, construct validity was examined for the IPSA components, using data obtained from participants in this study by using principal factor analysis. According to McArdle (1990), this method is considered appropriate for confirmatory validation of a construct. In this study, when factor analysis was performed using data obtained from participants, only one factor was extracted with factor loadings ranging from .97 to .99. The variance explained this factor was .99.

Sexual Abstinence Behavior Skills Scale (SABS)

The SABS, designed for this study was made up of two Likert-type questions on confidence in communication skills and three questions requiring responses to vignettes. The vignettes follow the suggested format from the WHO curriculum (WHO, 1994) adapted to develop the intervention for this study. The vignettes covered actions that indicate ability to remove self from compromising situation and communication skills needed to negotiate abstinence and refuse sex. This tool is attached in Appendix B. Cronbach alpha, performed to assess internal consistency, was .65. All 5 items were significantly correlated (.32 to .79) to the total score (SABS) at the .05 alpha level.

The same panel that assessed the IPSA prior to this study also assessed the content validity of this tool. Using Lynn (1986) content validity index approach, the

agreement was about 95%, and no changes were also made in the content of items. Some words were changed to accurately reflect terminology used in the setting. Construct validity of the SABS was also assessed in the current study, by conducting principal factor analysis. Two factors were extracted. The first four items loaded on one factor (loadings ranged from .67 to .78), while, the last item on the tool loaded on a separate factor (.80). The first factor accounted for 43.2% of the total variance while the second factor explained 24.9% of the total variance.

Age and Cultural Appropriateness

A one-page questionnaire, specifically designed for this study, was included in the posttest, to assess the intervention procedures and the instruments for age and cultural appropriateness. This questionnaire was made up of 10 items with yes/no options and follow-up open-ended components to these responses. The participants were asked to assess their understanding of the intervention, ease of reading the instruments, appropriateness of content, missing content, and suggestions on changes intervention. The one page instrument is also attached in appendix B. This tool was also given to the same panel that evaluated the IPSA and the SABS. Using Lynn's (1986) content validity index, the agreement on using the 10 items was about 86% on each item. The suggestions given by panel members on changes in terminology to reflect the setting were incorporated into the final version.

Study Procedure

After approval by the IRB at the University of Cincinnati (Appendix C), the investigator obtained approval of the study from the Southwest Provincial Delegation of National Education. The letter of approval was presented to the principal of the school

who also approved the study and eagerly offered his support. In Cameroon the standard procedure for obtaining consent for school-based studies involves obtaining consent from the school administrators only (Personal communication, pedagogic inspector of school, South West Province, Cameroon: Mua, April 2003). Students are entrusted to the care of school authorities while they are in school and parents trust these administrators to keep the best interest of the students at the fore.

However additional levels of consent were sought and obtained for this study to comply with protocols of the treatment of human subjects at the University of Cincinnati. After obtaining approval from the delegation of national education and the school principal, parents of participating students gave consent to participation. At the school level, a representative of the delegation of national education paid a personal visit to the school presented the content of the study to the principal, and the letter of approval. The principal gave his permission and offered to help in anyway he could. He was very instrumental in recruitment efforts. He worked with teachers of students who met the age requirement to announce the study in their classrooms, and mounted posters in the school announcing the study. He also sent letters to the families of all potential participants asking for their permission to let their children participate. He also worked with the students, to give them the consent forms to take home for their parents to sign. By the end of the week in which the study took place, 100% of the parents of potential participants had given either oral or written consent.

The parental consent form was written at a 6th grade reading level to accommodate the low adult literacy rate of 63% in Cameroon (World Almanac, and Book of Facts, 2002), The level was chosen, so that for parent who were illiterate, their

children (potential participants) would be able to read it to them. Provisions for verbal consent were also made on the form. During the recruitment process, parents of potential participants were informed that participation was voluntary, participants could withdraw at any time during the course of the study, and no personal identifiers were to be collected in the questionnaires.

On the day of the intervention, the students were also required to give assent in order to participate in this study. The assent forms these students signed were different from the parental consent forms. Both parental consent and participant assent forms are attached in appendix D. After consent and assent forms were verified, all students received a pretest. Data collected in the pretest questionnaire included demographic information, self reports on intentions to postpone sexual activity, and sexual abstinence behavioral skills. After this evaluation, all participants received the abstinence promotion intervention, over the course of two hours on a Saturday morning. The investigator personally delivered the intervention.

A participatory approach was used in the delivery of content. Question and answer format, small group discussion, small group exercises and use of real-life scenarios were all part of the intervention. Details of the intervention, including content and format of delivery are attached in appendix A. The students were then given the posttest following the intervention. To enhance privacy, a box was kept at the back of the room for students to return the completed tests.

Data Management and Analysis

Data obtained from subjects was entered into an SPSS file for data management. Individual level data of each item was closely examined for error in data entry. Outliers

were crosschecked with questionnaires and errors were corrected. The investigator also printed all of the data and crosschecked multiple samples of entered data to scores on questionnaires. After the data was cleaned, several levels of analysis were performed to address the two hypotheses and the secondary research questions. The hypotheses addressed were:

In 10-12 year-old Cameroonian girls who received a school-based intervention to reduce HIV infection:

1. Intentions to postpone sexual activity will be significantly higher at follow-up than at baseline
2. Sexual abstinence behavior skills will be significantly higher at follow-up than at baseline

A secondary aim of this study was to determine if the intervention procedures and instruments appropriate for the age and culture of participants.

Analyses performed included both descriptive and inferential analyses. Descriptive analyses were used to answer question three and to examine the distribution of items related to all three questions. In addition, inferential data analyses were used to answer the first two questions. Details on the specific types of analysis performed are outlined next.

Descriptive Analysis

The distributions of data were first examined visually for each variable of interest in frequencies and histograms. Univariate measures including minimum and maximum values, mean, and standard deviation were performed on each variable of interest. Secondly, scatter plots with LOWESS smoothing regressions were used to visually

examine bivariate relationships. This procedure provided a means to assess curvilinear relationships as well as linear relations. Further bivariate descriptive statistics such as correlation matrices were also performed on all variables of interest. Pearson, Product moment, and Kendall-tau correlations were also examined to evaluate the existence of both linear and non-linear relationships.

In addition to performing general descriptive analyses on all variables of interest, these analyses were also used to answer question on appropriateness of the intervention. The yes/no responses of the one-page questionnaire were summarized in percentages. The responses were also classified by age, living condition, and educational level of parents and household income levels. The open-ended portions of the questionnaire were also summarized to determine most frequent words or themes that indicated whether the instrument or intervention was appropriate or inappropriate. This summary was examined to determine overall appropriateness of the intervention and instruments as perceived by the participants

Inferential Analysis

Exact paired t-tests were used to compare means of pretest scores to means of posttest scores on intentions to postpone sexual activity and on sexual abstinence behavior skills. Alpha was set a priori as 0.05. Paired t test were used because the two sets of scores were collected from the same subjects and therefore not independent. Exact t-tests were used because exact tests are guaranteed to preserve type 1 error rate since, they use repeated permutations of the sample unlike classical that use approximations and require assumptions of normality (Cytel Software Corporation, 2003; Manly, 1991). Exact test utilizes powerful numerical algorithms that make inferences by permutating

the data that were actually observed, thus eliminating the need for distributional assumptions. These randomization tests have the advantage of making no distributional assumption (such as normality) about the data, while remaining as powerful as more standard tests (Horgan & Rouault, 2000). Since no assumptions of normality could be made on the convenient sample used in this study, randomization tests are better than traditional tests in eliminating incorrect conclusions. In addition, on data sets which are small and have variables with high percentage responses in one category, like the data obtained in this study, exact statistics are more appropriate (Manly, 1991).

To obtain a greater understanding of the data, t-tests analysis were supplemented with effect size estimates and confidence intervals. This approach is useful in helping researchers quantify the effect strength and gives upper and lower boundary estimates of the likely range of the effect (Rothstein & Tonges, 2000).

Chapter Four

Presentation of Findings

In this chapter, the results of the study are presented. This study used a quasi-experimental design to assess an intervention on intentions to postpone sexual activity and sexual abstinence skills. Baseline and outcome measures were obtained from a convenient sample consisting of 10 to 12 year old females. These two sets of data were compared to address the first two questions. Findings on other expected relationships that have been suggested in the literature and theoretical framework of this study are also examined. The third question focused on the appropriateness of the tools and intervention used in the study. The results from a one-paged questionnaire, administered with the posttest were summarized to address the third question. The chapter begins an examination of subject characteristics. This is followed by a presentation of the findings on each of the three research questions. In addressing each research question, relationships with demographic and other variables in the study were also explored.

Subject Characteristics

A total of 60 female students participated in this study. The age of students ranged from 10-12 years old with a mean age of 10.5. These participants constituted 96.8% of the total student population (62) that was eligible to participate. Two students, who came late, participated in the study but their data were not included because they were not present during the pretest and part of the intervention.

The participants hailed from eight different English-speaking areas of the country, represented by divisions (administrative units within provinces), in the questionnaire. These divisions included: Boyo, Donga-Mantung, Fako, Labialem, Manyu, Meme, Mezam, and Ndian divisions. These divisions were further grouped into provinces of origin. The South West Province was the province of origin for the majority of participants (61.7%). The division represented in the South West Province included, Fako, Meme, Ndian, Labialem and Manyu divisions. Students of North West Province origin made up 20% of the total participants. Divisions in the North West Province represented in the sample included, Boyo, Donga-Mantung, and Mezam. There were a few students (15%) whose provinces of origin were not in English-speaking provinces of Cameroon. The remaining 3.3 % did not indicate their division of origin.

The students reported a variety of living arrangements. The majority of students (66.7%) lived with both parents, 15% lived with single parent, 10% with grandparents while 8.3% lived with relatives. There was also some variety in reported family income, which is presented in Table 2, as the French Community in Africa (CFA) francs, the currency used in Cameroon. Approximately 500 francs CFA are equivalent to one U.S. dollar.

Table 2

Reported Household Income of Participants

Household Monthly Income	Frequency	Percentage
Below 20,000 francs	9	15.0
20,000-50,000 francs	11	18.3
50,000-100,000 francs	8	13.3
100,000-150,000 francs	8	13.3
150,000-200,000 francs	4	06.7
Above 200,000 francs	19	31.7
Unreported	1	01.7
Total	60	100

The reported mean age for the fathers of these students was 43.4 years of age (SD=7.4) with the ages ranging from 30 to 67. The reported mean age for participant's mothers was 36.6 years of age (SD=6.7) with the ages ranging from 23 to 65. There were some differences in reported highest educational levels of members of the household of these students (Table 3). In general most students (61.7%) had at least one member of their household who held a college degree. These findings show a 98% literacy rate among parents of students participating in this study. This rate is much higher than the national reported adult literacy rate of 63% (World Almanac and Book of Facts, 2003).

Table 3

Highest Educational Level of Household Members of Participants

Highest Educational Level	Frequency	Percentage
No Formal education	1	1.7
Primary School	4	6.7
Secondary School	8	13.3
High School	6	10.0
University Level or above	37	61.7
Other (technical)	4	6.7
Total	60	100

(Note: Primary, secondary, and university in Cameroon are similar to elementary, high school and college respectively, in the USA. For more details see table 1).

Intentions to Postpone Sexual Activity

The first research hypothesis was: In 10-12 year-old Cameroonian girls who received a school-based intervention, intentions to postpone sexual activity will be significantly higher at follow-up than at baseline. The Intention to Postpone Sexual Activity (IPSA) scale, used in assessing this hypothesis, was made up of three items. Each of these items had a minimum score of 1 and a maximum possible score of 5. The possible total scores for this scale therefore varied from 3 to 15, with 3 representing the highest intention to postpone sexual activity while 15 represented the lowest intentions to postpone sexual activity. In other words, the lower the score, the higher the intention to postpone sexual activity. In general, post interventions scores were lower than pre-

intervention scores. In table 4 below, the results of descriptive analysis on both pretest and posttest scores for each of these items are presented

Table 4

Results of Descriptive Analysis of the Intention to Postpone Sexual Activity (IPSA) Scale

Item (in next 3 months)	Mean		Standard Deviation	
	Pretest	Posttest	Pretest	Posttest
Likelihood of having sex	2	1.31	1.77	0.89
Feel about having sex	1.75	1.31	1.57	1.02
Plan on having sex	2	1.93	1.70	1.69
IPSA (Total)	5.70	4.55	4.00	3.04

(Note: 1 represents highest intentions to postpone sexual activity and 5 represent lowest intentions to postpone sexual activity for each item. On the total score, 3 represent highest intentions to postpone sexual activity while 15 represent lowest intentions to postpone sexual activity)

To explore other relationships that might exist related to this dependent variable as suggested in the theory and literature, bivariate statistics such as correlations and SPLOMs with LOWES smoothing were also performed. All items on the IPSA were found to have significant Pearson's positive correlations (from .97 to .99) to the total IPSA score at the .01 alpha levels. As expected IPSA and POSTIPSA were significantly correlated ($r=.755$, $P<.0001$). IPSA was also significantly correlated with the SABS($r=.626$, $p<.01$), a relationship suggested by the theory. In Appendix E, the detail results of linear and curvilinear relationships between intentions to postpone sexual activity and other variables, as detected by scatter plot matrices and regressions lines(LOWES smoothing) are attached. There were no significant correlations between intentions to

postpone sexual activity and many of the demographic variables, with one exception. A significant positive non parametric correlation (Spearman's rho) was found between intentions to postpone and reported household income ($r=.34$, $p=.007$). The positive correlation shows that intentions to postpone sexual activity increased as the household incomes of participants increased.

A number of inferential data analysis techniques were used to specifically assess the first hypothesis. These procedures included: exact paired t-test, using StatXact, confidence Intervals (CI), and effect size calculations. The exact paired t-test was used to determine if there was a significant difference between scores obtained before the intervention and scores obtained after the intervention from the same students. A significant difference was found ($t=3.40$; $p<.05$) between pretest ($M=5.70$, $SD=4.00$) and posttest ($M=4.55$, $SD=3.04$) intentions to postpone sexual activity means. Confidence intervals were also calculated on the paired samples to determine the upper and lower limits of the paired t-test. Details of the results of this test are presented in the table 5.

Table 5

Summary of Findings on Paired Samples Exact Tests of Intentions to Postpone Sexual Activity

Pairs	M	SD	95% CI on Difference		t	Significance (one-tailed)
			Lower	Upper		
IPSA-POSTIPSA	1.15	2.26	0.47	1.83	3.40	.0005
IPSA	5.70	4.00				
POSTIPSA	4.55	3.05				

Note: N=60, df =59

The effect size of the intervention on the intentions to postpone sexual activity was calculated using Lipsey's (1990) formula for determining effect sizes on paired observation. Using the formula presented in Appendix F, the effect size was .66. The confidence interval around this effect size was from .59 to .73

Sexual Abstinence Behavior Skills

The second hypothesis was: In 10-12 year-old Cameroonian girls who received a school based HIV prevention intervention, sexual abstinence skills will be significantly higher at follow-up than at baseline. The Sexual Abstinence Behavioral Scale (SABS), which comprised of five items, was used to gather data on this variable. For each item, the minimum possible scores was 1 while the maximum possible score was 5. The SABS therefore had a possible range of total scores from 5 to 25, and 5 indicated the highest possible abstinence behavior skills while 25 indicated the lowest possible abstinence behavior skills. In general, post intervention scores were lower than baseline scores. The results of descriptive analysis of scores on this scale are presented in table 6.

Table 6

Results of Descriptive Analysis on the Sexual Abstinence Behavior Scale

Item	Mean		Standard Deviation	
	Pretest	Posttest	Pretest	posttest
Difficulty delaying sex	2.90	2.52	1.77	1.80
Difficulty saying no	2.21	2.33	1.70	1.80
Saying uncomfortable	1.85	1.40	1.15	0.89
Resisting pressure	1.46	1.30	0.92	0.72
Recognizing enticement	1.98	1.37	1.47	0.94
SABS (Total)	10.28	8.74	4.18	3.98

(Note: On individual items, 1 indicates highest possible abstinence behavior skills and 5 indicate lowest possible abstinence behavior skills. On the total (SABS) score, 5 indicate the best possible abstinence behavior skills while 25 indicate the worse possible abstinence behavior skills).

The possibility of relationships between the sexual abstinence skills and other variables in the study were also explored. All items in the SABS had significant positive Pearson's correlations to the total score (.32 to .79, $p < .05$). The weakest correlation was with the last item of the scale. Scores on the SABS were significantly correlated to the post SABS as expected ($r = .802$, $p < .0001$). Scores on the SABS were also significantly correlated with scores on the IPSA ($r = .626$, $p < .0001$), a relationship proposed in the theory on which the study was based. Details on other bivariate relationships between abstinence behavior skills and other study variables as detected in scatter plot matrices with LOWES smoothing are included in Appendix E.

A number of inferential data analysis procedures were also used specifically to answer the second hypothesis. These procedures included exact paired t-test, confidence

interval estimations and effect size calculations. The exact paired t-test between pre and post intervention sexual abstinence skills was 4.51, alpha .0001. Table 7 summarizes the finding with the associated.

Table 7

Summary of Findings on Paired Samples Exact Tests of Sexual Abstinence Behavior Skills

Pairs	M	SD	95% CI on difference		t	Significance (one-tailed)
			Lower	Upper		
SABS-POSTSABS	1.50	2.57	0.84	2.17	4.51	.00005
SABS	10.28	4.18				
POSTSABS	8.74	3.98				

Note: N = 60, df = 59.

The effect size of the intervention on sexual abstinence behavior skills was also calculated manually using the Lipsey's (1990) formula for estimation of effect sizes on paired observation. This formula is included in Appendix E. The effect size was .75 with a confidence interval ranging from .67 to .83.

Appropriateness of Tools and Intervention

A secondary aim of the study was to determine if the intervention procedures and instruments were appropriate for the age and culture of participants. A one-paged questionnaire that was administered with the posttest was used to address this question. The one-paged questionnaire was made up of 10 items. Participants had the option to respond to each question with a yes or no. Depending on the response, there was room for additional comments to be made in open-ended segments of each question. Majority of

the participants (>75%) had favorable perceptions of the tool and the intervention and thought it appropriate. Summary of yes/no responses are presented in Table 8.

Table 8

Summary of Selected Responses on Appropriateness of Intervention and Instrument

Item	Percentages		
	Yes	No	NR
1. Comfort with content	73.3	25	1.7
2. Understood questionnaire	71.7	23.3	5
3. Skipped question	10	83.3	6.7
4. Study help change mind	68.3	28.3	3.3
5. Expected content not covered	11.6	86.7	1.7
6. Expected questions not asked	15	78.3	6.7
7. Some content should be left out	6.7	86.6	6.7
8. Learned new skill	73.3	26.7	0
9. Would recommend study to others	71.7	26.6	1.7

(Note: Total sample was 60. NR represents no response).

The responses on this questionnaire were further examined by age and ethnicity to determine if there were differences between these groups.

Age and Appropriateness of Tools and Intervention

The responses to the appropriateness questionnaire were examined, using Fisher exact tests, for differences in perceptions among 10, 11, and 12 year-old participants. No significant differences were found in responses between these three age groups. Non-parametric correlations (Kendall-tau) were performed because of the non-interval level responses, to assess for relationships between age and responses on any of the items on

the one-paged questionnaire. The only significant correlation was found between age and willingness (Table 9) to recommend the study to others and it was a positive correlation (.27, $p < .05$). In coding this question, 1 represented yes to recommending the study to others, while 2 represented no.

Table 9

Correlations between Age and Appropriateness Questionnaire Items

Item	Correlation (r)	Significance level (p)
1. Comfort with content	.083	.507
2. Understood questionnaire	.141	.256
3. Skipped questions	.178	.151
4. Helped in changing mind	.003	.979
5. Expected content not covered	-.108	.388
6. Expected questions not asked	.019	.879
7. Wanted some content left out	-.061	.622
8. Learned New Skills	-.006	.962
9. Would recommend study to others	.272	.029*

(* represents significant correlation $< .05$)

The positive non-parametric correlation on recommendation of the study to others indicates that as age increased, participants were more likely to choose responses coded with a higher number (2 instead of 1). In other words, the younger participant, were more likely to choose 1, which represents a positive response to recommending the study. This relationship between age and reports of willingness to recommend the study was

examined further by classifying the responses on this item by age. Figure 4 shows the percentages of participants in each category and their responses to this item. Eighty two percent of 10 year old students, 62% of 11 year-old students and 20% of 12 year old students reported willingness to recommend the study to others

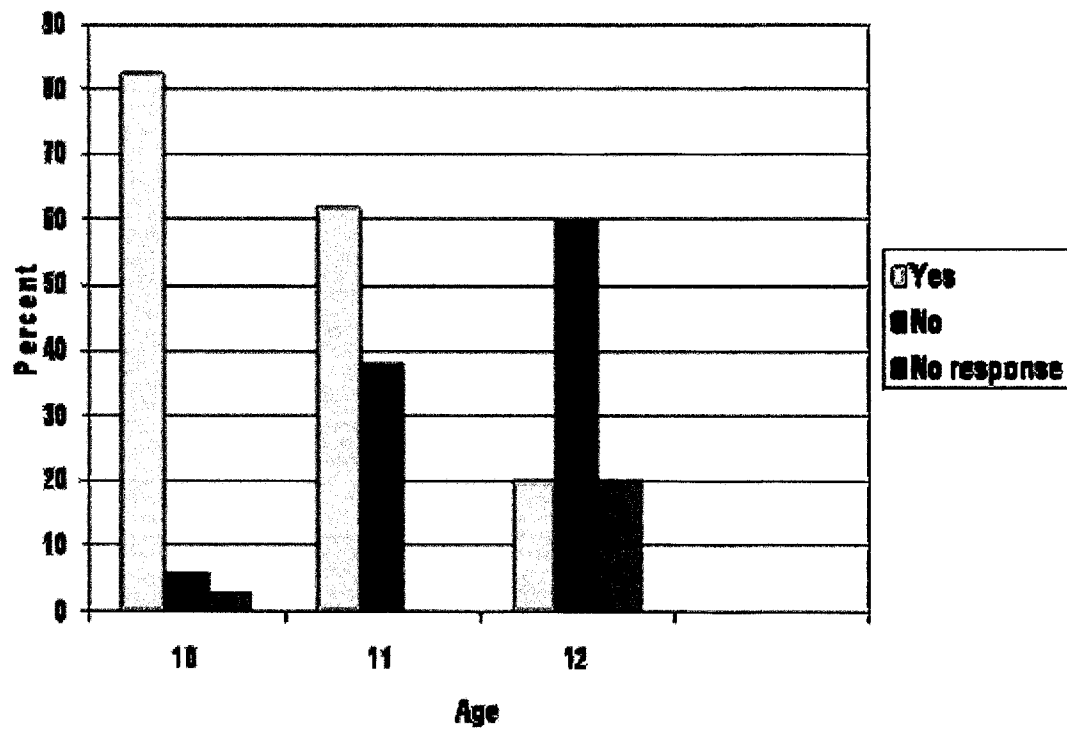


Figure 4. Reports of Willingness to Recommend Study to Others Classified by Age of Participants

Ethnicity and Appropriateness

The responses on appropriateness of tools and intervention were also examined for relationships with ethnicity (province of origin) and for differences in responses between different ethnic groups. When Fisher exact test were performed, no significant differences were found between participants from different ethnic origin. Non-parametric correlations (because of the non-interval level of the data) were used to assess the relationship between ethnicity and item on the questionnaire. These correlations were performed with the Southwest Province coded as 1, the Northwest Province as 2 and other as 3. Table 10 presents the resulting correlation results when Kendall's tau non-parametric tests were performed. Ethnicity was significantly correlated with reported understanding scales (-.277; $p < .05$), wanting some questions to be left (.314; $p < .05$) and reports of having learned new skills (-.239; $p < .05$). The positive and negative directions of these correlations simply indicate differences on how participants from the different provinces reported on these items. These differences will subsequently be more closely examined.

Table 10

Correlations between Ethnicity and Appropriateness Questionnaire Items

Item	Correlation (r)	Significance level (p)
1. Comfortable with content	.133	.234
2. Understood questionnaire	-.277	.013*
3. Skipped questions	.019	.865
4. Helped in changing mind	.085	.443
5. Expected content not covered	-.106	.345
6. Expected questions not asked	.005	.964
7. Wanted some content left out	.314	.005*
8. Learned New Skills	-.239	.035*
9. Would recommend study to others	-.107	.339

(* Represent significant correlation < .05)

The responses on which significant correlations were found were examined more closely. When reports of understanding of content were classified by province of origin, more participants from the Southwest province (81%) and other provinces (88%) reported understanding the content than participants from the Northwest Province (50%). In Figure 5 the responses on this item by province of origin are displayed.

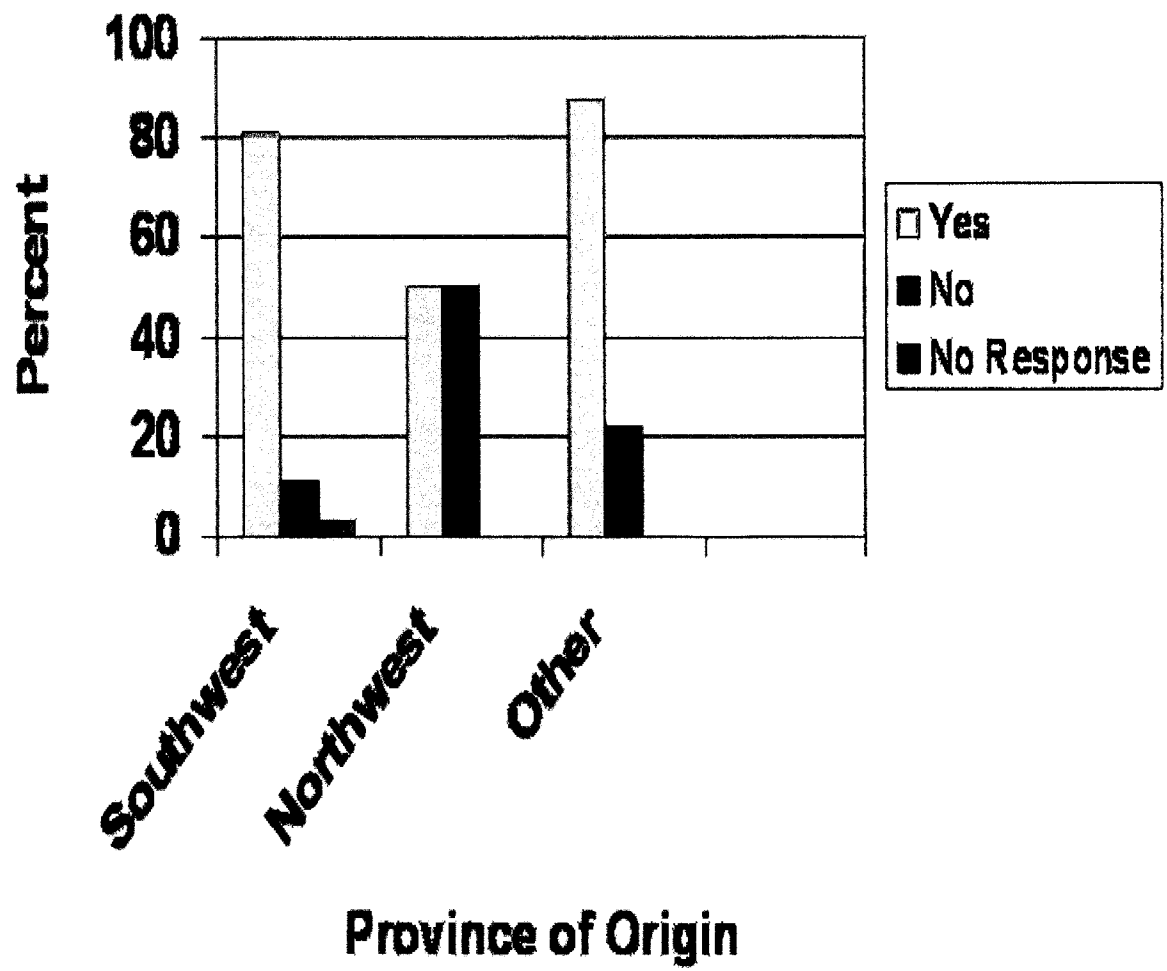


Figure 5. Reports of Understanding of Content Classified by Province of Origin of Participants

Reports of expecting some questions that were not asked were also further examined because of the significant positive Kendall tau correlation (.314; $p < .05$) that was found between this variable and ethnicity. Majority of participants did not want any of the questions to be left out. More participants from the Northwest province (92%) and other provinces (100%) said no, to wanting questions to be left out than the participants from the Southwest province (81%). The positive correlation reflects this, in showing that as the code for province of origin went up (from 1 to 3), the responses were more likely to be a higher value (2 for no, rather than 1 for yes). Figure 6 displays the responses to wanting questions left out by province of origin of the participants.

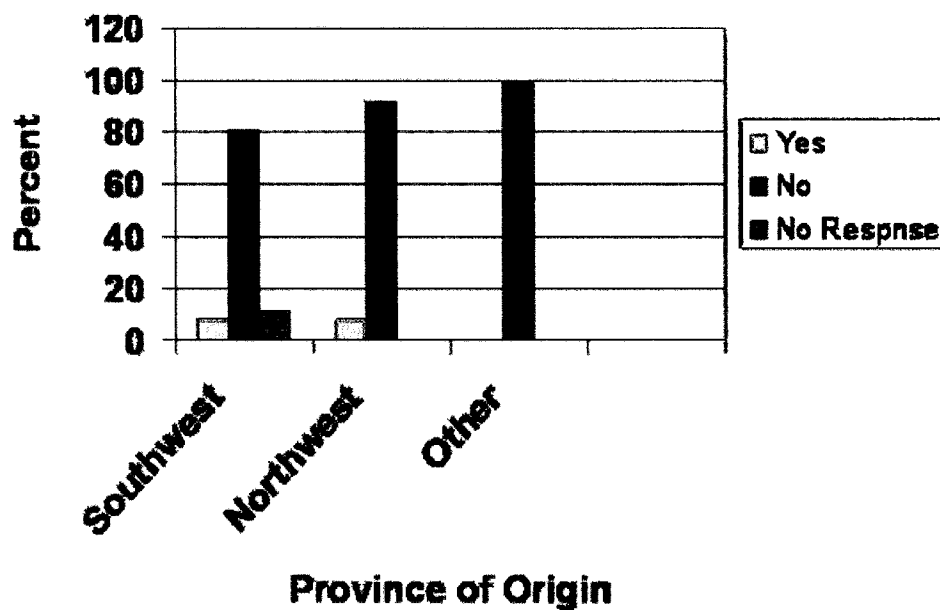


Figure 6. Reports of Wanting Some Questions Left Out Classified by Province of Origin of Participants

Lastly, the relationship between reports of having learned new skills was further examined because of the significant negative Kendall-tau correlation ($-.239$; $p < .05$) between responses to the question and ethnicity. The negative correlation indicates that as the code for province increase from 1 (Southwest province) to 3 (Other provinces), more of the participants in the groups were likely to respond yes (coded as 1, while no was coded as 2) to the questions on having learnt new skills. Most participants from the Northwest province (83%) and other provinces (89%) reported having learned new skills than participants from the Southwest province (60%). Figure 7 displays the differences on responses to having learned new skills by province of origin if the participants

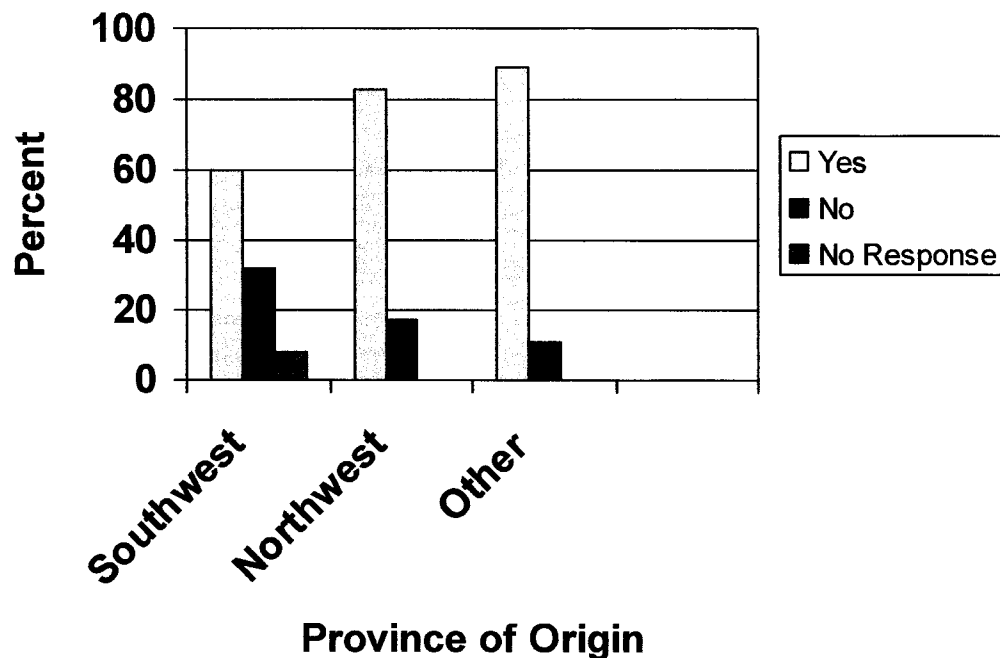


Figure 7. Reports of Having Learned New Skills Classified by Province of Origin of Participants

Open-ended Responses

Only about 3.7 % of participants failed to respond to any component of the appropriateness questionnaire. In most of the questions, open-end sections were to be used to provide reasons of unfavorable perceptions of tools or intervention. Of the few students who had negative perceptions, even fewer students made use of the open-ended segments of this questionnaire. These participants left the open ended section blank. It is unclear if the participant simply had no further comments to add, in the open-ended sections of these questions or if they skipped them. For example when asked to give recommended changes to the study, many participants indicated that they had no recommendations while about 25 % of the participants left the question blank. It is unclear if those that left the question blank had no recommendations for changes to the study or if they decided to skip the question.

1. Instrument Related Comments

Twenty three percent of the total participant population reported having some problems understating the questionnaire. At the time the instrument was initially administered students were encouraged to ask questions about words they did not understand. The words identified during this time included; skills, sexual intercourse. Other students wanted clarifications on where they should indicate their response on the scales. The students reporting difficulty understanding the questionnaire did not identify the areas of difficulty. Only one student indicated that they did not understand the word “skills.”

Ten percent of the students reported having skipped questions. No reasons were provided for skipping the questions. The possible reasons for skipping questions will be

explored in the discussion section in the next chapter. On examination of the data, about 11% of the students actually omitted responses in at least one question. The reasons for omitting remain unclear. No significant correlations ($r=.138$; $p=.269$) were found between reports of difficulty and skipping questions. The questions skipped during the pretests were on items in both the IPSA and The SABS and on demographic variables, while questions skipped during the post tests were in the IPSA. There was no visible trend in the skipping of questions. None of the students skipped the same questions during the pretest and the posttest.

Fifteen percent of participants reported expecting some questions that were not asked in the study. The only expected questions identified related to knowledge of HIV transmissions. Significant correlations were found between expecting more questions and difficulty understanding questions ($r=.252$; $p=.043$). In addition the correlation between expecting more questions to be asked and expecting more topics to be covered was significant ($r=.29$; $p=.022$)

2. Intervention Related Comments

Twenty five percent of the participants reported not feeling comfortable during discussion in the intervention used in this study. However many of them failed to indicate what specifically made them uncomfortable. A few identified the topic of sexual behavior as an area of discussion that made them uncomfortable. No significant correlations were found between feeling uncomfortable with the content of the intervention, and age, ethnicity, or any of the other questions addressing appropriateness of the intervention.

Only 16% of the participants indicated that they expected some content that was not discussed during the intervention. Two specific areas identified included information

on progress toward a vaccine and current treatment modalities. There were no significant correlations found between wanting more content covered and age or ethnicity.

Significant correlations were found between wanting more content covered and skipping questions ($r = .480$; $p = .0001$), expecting more questions to be asked ($r = .291$; $p = .022$), and wanting some content to be left out ($r = .573$; $p = .0001$).

In addition, even fewer participants 6.7% thought some of the content in the intervention should have been left out. These participants failed to identify content that they considered inappropriate for the intervention. There was a significant relationship between wanting some content to be left out and ethnicity. However, no significant correlations were found between age and wanting content to be left out. As presented earlier, significant correlations were found between wanting content to be left out and skipping questions ($r = .366$; $p = .004$), and wanting more content covered ($r = .573$; $p = .0001$).

In general the open ended questions added very little information from what was obtained through the yes/no sections of each question. Most participants reported that they had learned new skills, and would try to share skills they had learned with family members. Many thought the content of the intervention was sufficient. However there were some who would have wanted information on progress towards a vaccine for HIV and current treatment modalities. Many participants indicated that they would recommend the study to others because they had learned new skills that would be useful to other people they knew.

Summary of Findings

In all 60 female students between the ages of 10 and 12 participated in the study. Two hypotheses were evaluated to assess the effectiveness of the school based intervention used. On the first hypothesis that examined intentions to postpone sexual activity the mean scores (pretest, $M=5.70$, $SD=4.00$ and posttest, $M=4.55$, $SD=3.04$) were significantly lower (indicating higher intentions to postpone sexual activity) after the intervention than at baseline ($t=3.40$; $p<.05$). On the second hypothesis, which examine sexual abstinence skills, mean score (pretest, $M=10.28$, $SD=4.18$ and posttest $M=8.74$, $SD=3.98$) were significantly lower after the intervention than at baseline, also indicating higher abstinence skills. In addition, many of the participants (76%) reported that the intervention was appropriate to their age and culture

Chapter 5

Discussion and Conclusions

This study used a quasi-experimental design and was carried out to determine whether a school-based, theoretically driven intervention made a significant difference in two variables. These variables included: intentions to postpone sexual activity, and sexual abstinence behavior skills. Different levels of analyses were conducted to examine the distribution of individual variables, the relationships among variables in the study, and the effectiveness of the intervention in making a difference in outcomes. In addition, because of the preliminary nature of this study, the appropriateness of the intervention and instruments for the target population was also assessed. Sixty female students between the ages of 10 and 12 received the brief intervention that was based on the Theory of Planned Behavior (TPB). The instrument used to assess the effectiveness of the intervention was also based on the same theory. The investigator found that there was a significant difference between pre- and post intervention scores in both study variables. In addition, the majority of participants in this study perceived the intervention and study instruments appropriate.

Effectiveness of the Intervention

Given the widely recognized risk of HIV infection in young females in sub-Saharan Africa, the results of the present study are encouraging. The intervention was both effective and appropriate in this study. In general, the two research hypotheses that were tested through exact paired t-test were supported. In addition, participants found the intervention and tools appropriate for their age and culture.

Discussion of Hypothesis 1

The first hypothesis: In 10-12 year Cameroonian girls who received a school based HIV intervention the reduce HIV infection; intentions to postpone sexual activity will be significantly higher at follow-up than at baseline. The null hypothesis in this case was rejected and the research hypothesis was supported with significant exact t-test ($t=3.40$, $p=.0001$). The intentions to postpone sexual activity after the intervention were significantly higher than those reported before the intervention in this study. To the investigator's knowledge, no other studies have been conducted in Cameroon among preadolescent girls that focused on intentions to postpone sexual activity. This study is therefore the first in this area of research in Cameroon. However numerous similar studies have been conducted in other regions of the world. These previous studies laid the groundwork for this study and were used to assess the congruence of these findings to existing knowledge in this area of research.

The significant increase in intentions to postpone sexual activity in this study is consistent with findings in other intervention studies in similar populations in developed countries (Blake et al., 2001; Jemmott et al., 1998). The findings from this current study are also consistent with results of other experimental studies among adult populations, in which interventions focused more on intentions to use condoms (Bennett & Bozionelos, 2000; Jemmott et al., 2002; Kim et al., 1997; Kirby et al., 1997). The findings in this study are also consistent with findings of intervention studies conducted with adolescent populations, conducted in other countries in sub-Saharan Africa that have shown promise in delaying sexual intercourse (Fitzgerald et al., 1999; Klepp et al., 1997; Kuhn & Steinberg; Mi Kim et al., 2001; Miller et al., 1998). It is important to note that all of

these studies had methodological differences with the current study. None of these studies had homogenous samples like the one used in this study. All studies included males and females, had participants with a wider age range 12-24, and included comparison or control groups. The finding in this study therefore adds to the growing body of evidence that behavioral skill building, theory driven, intervention studies can increase intentions to postpone sexual activity and adopt safer sexual behaviors in pre-adolescents as well as in older populations.

Although the findings on intentions to postpone sexual activity were statistically significant, a surprising finding related to this variable was the low means of baseline scores ($M=5.77$, possible range of score 3-15). The standard deviation from the mean however, was relatively large (4.00) in addition minimum baseline scores obtained from participants on the IPISA were 3 while maximum score were 15 indicating that not all of these scores were at the low end of the scale. It is possible that a floor effect was present in the tool (at least for some participants), thereby leaving little room for improvement from the effects of the intervention. However regarding the young age of the participants, low baseline score could be considered a desirable finding especially if one wants to target students before they become sexually active and encourage the adoption of safe behavior. Higher baseline score would have indicated that students were planning to have sex and changing their minds might be a more difficult process than equipping them to adopt safe behaviors on which they had not yet made plans. The clinical significance of finding on intentions to postpone sexual activity in this study is addressed later in a combined discussion of the findings on both study variables.

Relationship of Hypothesis 1 to the Theory of Planned Behavior

In the theory of planned behavior on which the study was based, intentions to postpone sexual activity would be a function on increased positive attitudes, social norms and perceived control over postponing sexual activity. The intervention as discussed earlier focused on these antecedents of intentions to postpone sexual activity. The measurement of intentions also followed recommendations from the theorist on how to operationalize the theory (Ajzen, 2001). The significant finding indicated by the change in this variable therefore adds to the growing body of literature that supports proposition from this theory. In the theory, intentions on a specific behavior are proximal determinants of the actual performance of that behavior in the short run, with the ability to predict behavior reducing over time. In this study, this proposition was not assessed, however based on finding of studies evaluating the links in this theory (Godin & Kok, 1996; Jemmott et al., 1998; Jemmott et al., 2002), one could argue that increased intentions in this study can predict the behavior of these students for at least 3 to 6 months.

It is also worth noting that the sustainability of the effect of the intervention on intentions to postpone sexual activity was not evaluated in this study so the results have to be interpreted with caution. Previous studies based on the TPB that examined intentions to postpone sexual activity have come up with conflicting results on the sustainability of interventions. For example, Boekeloo et al. (1999) failed to find sustained effects after conducting an intervention during a doctor's visit that consisted of audio taped risk -reduction strategies in a sample of adolescents (12-15). At the immediate post intervention and a three-month post intervention evaluation these

researchers found the intervention effective but the gains were not sustained at the 9-month follow-up. In another study, Jemmott et al. (1998) failed to find sustained effect on intentions to postpone sexual activity, 12 months after conducting a clinical trial among black adolescents (11-19 years old).

On the other hand, other studies have found sustained effects on intentions and actual postponement of sexual activity at the one year follow -up. For example, Howard and McCabe (1990) tested a program on 13- and 14-year-old American students that was added to existed sexual education school program. The effect of the program was sustained at the two-year follow – up in students who had not yet initiated sexual activity when the study began. More students in the intervention group were found to have not initiated sexual activity than those in a comparison group. In study of sub-Saharan primary school students (Klepp et al., 1997) also found that positive effects on intentions to postpone sexual activity were sustained in sub-Saharan students at a 12-month follow-up evaluation. These researchers had conducted a randomized control trial among primary school students (mean age 13.6) in Tanzania. These differences in sustainability could be related to the ages of participants. The effects of the intervention appeared to have been sustained in preadolescent and early adolescent populations and not sustained in studies focusing on older adolescents.

Discussion of Research Hypothesis 2

The second hypothesis tested was: In 10-12 year-old Cameroonian girls who received a school-based intervention to reduce HIV infection. Sexual abstinence behavior skill will be significantly higher at follow-up than at baseline. This null hypothesis was rejected while the research hypothesis was supported with significant findings from

paired exact t-test performed on pre and post-intervention sexual abstinence skills that were reported by these participants. These findings are also consistent with other findings in similar studies conducted in developing countries that focus on improving sexual behavioral skills to prevent HIV infections (Blake et al., 200; Godin & Kok, 1996; Jemmott et al., 1992). The finding is also consistent with findings of at least one study, conducted in sub-Saharan Africa among primary school students that incorporated behavior skills (Klepp et al., 1997). The findings in this study contradict some earlier school based studies (Kirby et al., 1991; St. Pierre et al., 1995) in the US, in which researchers failed to find school based abstinence interventions effective in delaying sexual activity. The difference might be due to the fact that most of these studies focused on older adolescents some of whom had already initiated sexual activity.

It must be noted that the baseline scores on abstinence behavior skills were very low. It is therefore possible that a floor effect might have been also present in the tool assessing this variable, leaving very little room for improvement after the intervention. It remains unclear as to whether these low scores are a function of the age of the participants, something else unique about this group of participants, or a problem with the tool. Further evaluation of this tool could shed some light on these low baseline findings. The floor effect, was not large enough to obscure the statistically significant ($t = 4.51$; $p < .0001$) difference found between pretest and posttest scores.

Based on the links proposed in the TPB (Ajzen, 1988, 2001), the intervention focused on improving attitude toward delaying sex, improving perception of behavioral control over postponing sex and promoting favorable norms towards abstinence. According to this theory these variables influence sexual behavior abstinence skills,

which are in turn proximal determinants of intentions to postpone sexual activity and actual abstinence behavior (Ajzen, 2001). In addition, consistent with propositions in this theory the two study variables were significantly correlated in both the pretest and posttest scores. The significant findings in this study add to the growing evidence that interventions using the TPB can be effective in interventions focusing on safe behaviors for HIV (Bennett & Bozionelos, 2000; Holtgrave et al., 1995; Jemmott et al., 1998; National Institutes of Health, 1997).

Discussion of Sample Characteristics

Some interesting findings on sample characteristics merit discussion here, because they inform the interpretation of findings on study variables. In particular, findings on income and educational level of family members of these participants appeared to be remarkably different from national data. Participants in this study came from homes where adults were more educated than the general population of Cameroon. The literacy rate of adult family members in this study was 98% compared to a 68% national adult literacy rate. In addition, participants in this study came from more affluent homes than the general population. In a country where the national unemployment rate is about 30%, the reported monthly household incomes of participants in this study indicated that most of the parents were gainfully employed. These findings may be a direct result of the location of the school used in this study. The school is located in a university town and it is less than 2 miles from the university. This university is the second largest public university in the country. It is possible that the parents of these students may be employed at the school or other affiliated institutions. The easy access to the large public university may have also influenced parents to gain more education. High levels of education and

socioeconomic status are two factors that have been linked to more knowledge of HIV prevention strategies (UNAIDS, 2000, 2003). It is possible that these two socioeconomic factors might have contributed the low pretest mean scores and possible floor effect discussed earlier.

Practical Significance of Findings

Although these findings were statistically significant, the results simply speak to the probability that the difference between pretest and posttest scores was not due to chance. Statistical significance does not provide information on the size of the difference between pretest and posttest scores or on the practical significance of the intervention. To obtain this type of information, effect size calculations were calculated on using means and standard deviations. To estimate the likely range of the effect, the confidence interval at the .05 level of significance was also calculated on the effect size estimation.

The effect size calculation on intentions to postpone sexual activity was .66, while the effect size on sexual abstinence skills was .75. Both variables had fairly narrow confidence intervals on their effect sizes. The confidence interval range did not also include zero, thus supporting the results of significance testing, by indicating that the difference between pretest and posttest scores were statistically significant at the .05 level. Using Cohen's (1988) hesitantly offered guidelines that indicate that effect sizes from .5 as medium, the effect size of the intervention in this study could be interpreted as moderate. However some researchers (Cohen, 1988; Cooper, 1998; Glass, McGaw, & Smith, 1981) question the use or arbitrary classification of low, moderate or high on effect size. These researchers further argue that the effectiveness of a particular intervention can only be interpreted in relation to other interventions that produce the

same effect. The difficulty in using this approach was in the fact that no other studies could be located that had been conducted in Cameroon among this age group for comparison purposes. An examination of randomized controlled studies in other countries (Blake et al., 2001; Jemmott et al., 1992; Klepp et al., 1997) focusing on similar variables revealed a mean effect size of .6. Since the effect size in this study is similar to others in the same content area, one could conclude that these findings have clinical significance.

In addition, Lipsey and Wilson (1993) argued that clinical importance of an effect depends entirely on the relative cost and benefit. A small inexpensive intervention that changes behavior by an effect size of even .1 could be a very significant improvement, particularly if applied uniformly to all students or if the effect could accumulate over time. This argument could certainly be made for preadolescent HIV prevention in females, where delaying sexual activity even for a short time might decrease biological susceptibility, decrease the number of lifetime partners and allow for more informed decision about sexuality when students are older (Laga et al., 2001). All of these factors can have a cumulative effect on decreasing the incidence of infections on the students, their potential partners and their offspring.

Appropriateness of Tools and Intervention

Prior to this study, no studies were found in the literature that had directly assessed age-appropriateness of school-based HIV preventative interventions in preadolescents in Cameroon. In fact there appears to be no universally acceptable age to begin HIV intervention. While researchers (Klepp et al., 1997; Mallory & Fife, 1999; UNAIDS, 2003) indicated that starting HIV preventative interventions before students

start initiating sexual activity, the target age at which such interventions should begin remained unclear. As discussed in chapter 2, the World Health Organization recommended starting preventative interventions before the onset of sexual activity. When prevalence and incidence rate studies on Cameroonian youth were reviewed in the same chapter, students were found to be initiating sexual activity between the ages of 10-14. These two factors provided the bases for targeting 10-12 year old students. However concerns remained on developmental level of participants, and their ability to understand and use the intervention. Because of these concerns the age appropriateness of the intervention was assessed from perceptions of participants.

In general, all participants including the youngest age group considered the study appropriate. The impact of the disease in sub Saharan Africa and the lack of age appropriate interventions that equip these students to protect themselves from the disease might have contributed to this positive perception. These students are likely to know someone at a personal level who is suffering from the disease or has died from the disease. To date, HIV preventative strategies in the country have focused on media campaigns largely promoting condom use and HIV testing. Learning how to protect themselves from infections in socially acceptable ways in this context is likely to be acceptable to participants. The importance attached to protection from this disease was probably the reason for the 100% positive response rate from the parents of these students.

In addition, steps were taken to the process of developing the study to ensure that students in this setting would be able to understand the content. Evaluation of study procedure by teachers involved in the educational system in Cameroon during the

development phase and the resulting modification made from this evaluation may have contributed to the perceived appropriateness from even the youngest of participants. Furthermore, participants were aware that the researcher was from the same part of the country and grew up in the environment. This might have added to positive perceptions of the study.

The possibility that social desirability bias might have also contributed to responses cannot be ignored. It is conceivable that some respondents wanted to please the researcher by reporting that intervention protocols and tools were appropriate. However, in at least one of the areas assessed, the actual number of students who skipped questions was compared with self-reports of having skipped a question. As described in detail in the result section the percentages were comparable, suggesting that these students accurately responded to the question.

When responses on appropriateness were examined by age, no relationships were found between age and responses on appropriateness. It is worth noting that the majority of the participants (58.3%) were 10 year-olds, while 33.3% were 11 year-olds, and only 8.3% participants were 12 year-olds. When the percentages of responses were classified by age, more 10 year-old participants proportionately thought the tools and intervention were adequate than older participants. They also skipped fewer questions. This indicated that the intervention and tools were appropriate even for the youngest group of participants. The proportionately better performance of 10 year-old students might be a developmental level issue or a social desirability issue or simply due to chance since age was not significantly correlated with any of the items. Reasons behind the difference

remain unclear and might be better investigated with a larger sample with relatively equal numbers of students in all three age groups.

The responses on appropriateness were also examined by ethnicity. Participants were from two major English speaking ethnic regions or provinces of the country; the Northwest and Southwest provinces. A few of the participants (15%), were from a various other provinces in the country and were all grouped under “other.” In general, students from all ethnic divisions considered intervention and tools appropriate. However there were some differences between participants from different ethnic in their responses to some of the items on the one-paged appropriateness questionnaire. These differences were on questions that examined understanding the instrument, wanting some of the questions on the instrument to be left out, and reports of having learned new skills. More participants (81%) from the Southwest province reported that they understood the content of the study than participants from the Northwest province (50%). On a question about wanting some questions in the study to be left out, more participants from the Northwest province(92%) compared to 81% of participants from the Southwest province reported not wanting any of the questions to be left out. In addition more participants from the Northwest province (83%) reported having learned new skills than participants from the Southwest province (60%).

In all, more participants in the Southwest Province considered the instrument and intervention appropriate, than their counterparts in the Northwest Province. These findings have to be interpreted with caution considering the convenience sample and the relatively small number of participants (20%) from the Northwest province. This difference might also be a reflection of variations in cultural norms related to sexuality

issues between the two provinces. In at least one descriptive study (Rwenge, 2000) conducted in the Northwest Province, researchers examining socio-cultural factors associated with risky sexual behaviors found differences among participants from different provinces. The researcher suggested that these differences reflected different levels in sexual permissiveness among ethnic groups. In the same study, participants from the Northwest Province were found to have initiated sexual activity earlier than their counterparts from other provinces (Rwenge, 2000). Reports could not be found in the literature that provided any specific difference in cultural practices in these provinces that could account for the difference noted in Rwenge's (2000) study and in the current study. This might be an area that could be explored in future research studies.

It must be noted that the choice of measures for appropriateness of the intervention might have influenced the type of results obtained. The choice of yes/no format has the advantage of being more appealing to participants because it demands less concentration but variability in the responses is also lost by using this format (DeVellis, 1991). The open-ended sections of the questions added to elicit more in depth information were often not used by participants. For those who used it, responses were too brief, unreadable or cryptic. Face to face interviews would have been a better approach in eliciting more in depth information.

In all, significant findings on the first two research questions and a positive finding on the third research question are encouraging. The findings indicated that this intervention can be effective in increasing intentions to postpone sexual activity and increase behavior skills at least in the short run, among preadolescent females in

Cameroon. These findings, especially if replicated in more rigorous designs have potential implications for research, practice and policy.

Implications of the Study

Findings in this study have implications for research. This study was preliminary in nature, designed to assess effectiveness and appropriateness of a study intervention and study tool. Since findings show promise, a new large modified study is warranted, to see if the findings can be replicated. Practical lessons learned from this study could also inform the new study. In addition to finding the intervention effective, the researcher learned that facilitating discussions in a room full of 60 students between the ages of 10-12 was difficult. Even when students were divided into smaller groups, ensuring that students stay on task in all groups was a daunting task for one person. In subsequent studies it would be better to deliver the interventions to smaller groups at a given time. If this is done, the researcher would have to institute measures that would ensure uniformity of delivery of the intervention.

Another practical lesson learned was that the promotion by academic merit approach in Cameroonian schools leaves relatively very few 12 year-old students in the primary school system. Most students, by age 12 have graduated from primary schools and are dispersed in secondary schools in different regions of the country. This means that a school-based investigation, in which the researcher wants to recruit relatively equal numbers of students who are 10, 11, and 12, using the same sampling methods of this study would be challenging. The researcher might have to work with a relatively few numbers of 12 year old primary school students or conduct the research in a secondary school where most 12 year olds are found and thereby lose the younger age groups. A

longitudinal study among 10 -12year old students would also be fraught with attrition problems because of this practical issue. Along with lessons learned, the study also raised numerous questions that can be answered in subsequent studies. Questions on generalizability of findings, sustainability of effects, most suitable person to deliver intervention, and most appropriate venue in the school curriculum for HIV preventative interventions remain unanswered. Subsequent studies will need to be designed to address some of these issues.

First, a study using a larger random sample is needed. Considering the administrative structure of provinces and divisions in Cameroon, cluster random sampling could be used to randomly obtain classrooms with students that meet the age requirement. Study participants could then be randomly (ensuring more heterogeneity) selected from these classrooms. A randomized community trial could then be conducted with classroom or schools as units of analysis. The new study would also need to have a longer duration of at least one year, to determine if the effects of the intervention are sustainable. If the findings of a randomized control trial using different more heterogeneous samples were similar to findings in this study, a strong rationale for changes in community health practice would be established. It must be noted that before research findings can be used to change community practice in Cameroon, political leaders would have to buy into findings and provide supporting mechanisms to educate community health practitioners or teachers in schools on the implementation of such an intervention.

Secondly, longitudinal studies are needed to examine the sustainability of the effect to this type of brief intervention over time. Such studies would allow for actual

behavior and consequences of behavior to be monitored. For example the incidence of other sexually transmitted disease or pregnancy in the sample could be monitored and compared to verbal reports on sexual behaviors. This study could start with pre-testing and intervention with 10 year-old students and follow them for five years as they transition into adolescence and are called upon to use these skills. Data collected from self-reports on safe sex behaviors could be augmented by indicators of unsafe sex behaviors such as incidence of pregnancy and sexually transmitted diseases in the sample. Students in the intervention group could be compared over these years to students who did not receive the intervention or to national rates of sexually transmitted diseases and pregnancy in comparable groups. Investigators initiating this type of study would have to recruit a very large sample because attrition could be a huge problem. Another practical concern is that preadolescents are in primary schools and by age 12 and 13 they move on to secondary schools in different locations, so it might not be feasible to conduct follow-up assessments on the sample after two or three years.

Third, other studies could determine who would be more effective in delivering or facilitating the intervention. In developed countries, reviews of multiple studies indicate that peer led, adult led interventions are comparable in effectiveness. However, such studies have not been conducted in Cameroon or in sub-Saharan Africa to systematically assess the type that would be more effective. Findings in this study suggest that adult led interventions are effective in this sample. In a study conducted on sexually active adolescents in the northern part of Cameroon, peer led interventions were found to increase condom use among participants (Speizer et al., 2001). Regardless of whether peers or adults are used, researchers suggest that the gender of the facilitator has to be

similar to the gender of participating students (Jemmott et al., 1998) and that separating female students from male student in heterogeneous samples lead to more effective interventions (Kuhn & Steinberg, 1994; Mallory & Fife, 1999).

Lastly, another area to be investigated could be the most suitable area in the school curriculum in which HIV prevention intervention should be embedded. Comparisons could be made on effectiveness and feasibility of including it as part of a class or as part of a special activity at school. The most appropriate duration of the intervention could also be investigated. Determining whether or not one long intervention or a series of brief age-appropriate intervention over a number of years is most effective would also be important. The World Health Organization (1994) has advocated brief age appropriate interventions starting with an abstinence focus on students younger than 14 and introducing a safer sex practice approach such as condom use and single faithful partners for older students. Although several studies recommend that these issues be assessed in future studies, no studies could be located that had investigated these aspects of implementation.

All these areas of inquiry discussed above could be addressed in future studies. The results could yield valuable answers needed to address the problem of rapidly rising HIV infection rates in Cameroon and in sub-Saharan Africa. Administering a social desirability scale in any future studies would also go a long way in assessing the accuracy of self report measures.

Practice Implications

It is important to acknowledge that a single study like this one does not necessarily provide a strong basis for changes in practice. However, the study does

support previous findings in other studies. The findings in this study, especially if replicated in a randomized control trial in Cameroon, could have important implications for practice. Currently, there is no national school based HIV prevention program/instruction in Cameroonian primary schools. The preadolescents in this country and region of the world are at high risk for HIV infections as demonstrated in the literature review. Effective interventions to reduce this risk remain a necessity. Community health nurses need to be able to identify populations at risk and implement effective programs targeting these risk groups. The schools offer unique avenues to reach large number of students in an environment suitable for learning. Teaching behavior skills that could increase feeling of control have long been identified as one of the most effective preventative interventions (Mallory & Fife, 1999).

Interventions like the one used in this study, which are theoretically driven, culturally relevant, and age appropriate have been advocated by many experts in the field of HIV prevention (National Institutes of Health, 1997; UNAIDS, 2003). In addition to being effective, researchers have found HIV prevention interventions to be cost effective (Holtgrave & Kelly, 1996). Implementing such programs in the Cameroonian school system therefore has potential benefits to the students themselves, their future partners, and the government.

Community health nurses can play a key role in mobilizing grassroots efforts, working with existing non-governmental agencies in Cameroon, and the government to effectively target resources where they can be most fruitful. To date, the focus of the government has been on public awareness programs, testing, and securing cheaper medications for those infected (Rwenge, 2000). Awareness campaigns have not

necessarily translated to change in behavior as evidenced by the continued rapidly increasing rates of infections. An intervention like the one used here that was theory driven and focused on building necessary skills for prevention can lead to better outcomes.

Health Policy

The government in Cameroon provides the healthcare to its citizens, under the auspices of the Ministry of Health. Changes in the services provided often come through the legislative branch. In 1998, The Minister of Health in Cameroon identified equipping Cameroonian preadolescents and adolescents with skills necessary to reduce their vulnerability, as key to controlling the escalating infection rate in the country (Musa, 1998). Cameroon is also a signatory to many international agreements where participants agreed to focus efforts on the prevention of HIV infection in youth (UNAIDS 2001). To date, there are no nationwide programs targeting adolescents or preadolescents to reduce their risk for sexually transmitted diseases. Legislative action mandating school-based HIV prevention programs would be a good place to start, in addressing the problem and making good on promises. The findings in this study and others with similar results would provide the basis for such action.

Evidence shows that prevention efforts at a national level work as demonstrated in Senegal, where the national response to the HIV threat was swift, well planned, and far reaching. Political leaders had a huge role to play in encouraging open discussions of the danger posed by HIV and in seeking support of the religious community. Sex education was integrated into primary and secondary school curriculum. Other strategies to improve safer sex practices in older populations were also introduced. The result has been a

consistently low prevalence rate of below 2% in Senegal (Anderson, 1998; UNAIDS, 2003). Another example of the effectiveness of nationwide legislated efforts to prevent HIV infection is in Uganda. The country was one of the worse affected nations in the late 1980s. Through high-level political leadership for HIV prevention, a national program plan that was multifaceted, with strong community involvement, the rates of HIV infections have reduced dramatically (UNAIDS, 2003).

The trend of escalating HIV infection rates (From 1% in 1988 to 11.9% in 2001) in Cameroon over the past two decades could be reversed by legislative action creating a nationwide multifaceted program. This would not be an easy process. Cameroon has more cultural and religious diverse groups than some of the countries in which nationwide programs have been successful. There are still people in the country that are in denial about the disease (Musa, 1998; UNAIDS, 2000), while others have had first hand experience with morbidity and mortality from it. It appears that political leaders in the country have yet bought into the rationale for a national multifaceted program that includes school-based preventative interventions. The focus has remained on sensitization and information campaigns that have shown little or no results to date. Cultural, religious and political sensitivities surrounding this health problem tend to run high as well, because different religious and cultural groups tend to have vastly different and conflicting ideas on how sexuality issues should be handled (Musa, 1998; Nicholas & Durrheim, 1995). In addition, some of the programs may not demonstrate immediate effectiveness since the disease has a long latency period. However action is imperative, if the health of the young people of this nation is to be protected. If these results were replicated in more rigorous studies, the finding would suggest that school-based HIV

prevention interventions are one of the areas in which limited resources could be invested. The price of inaction can only be much larger than investing in the young today.

Limitations

A quasi- experimental design, without randomization was used in this study. In addition self-administered instruments eliciting self-report data were used in data collection. Threat to internal and external validity inherent in such a design cannot be ruled out in this study.

Internal validity

Self-reports were used in this study and it is possible that participants might have provided inaccurate self-reports. The presence of a floor effect on the scales, discussed earlier might have also introduced error. The use of scales in assessing study variables might have introduced response set biases that could increase error. Also, social desirability bias could have been present in participants (due to their young age, and respect for older people present in the culture) and the tendency to consistently select extreme responses could have been present. Regarding cultural influences, Mensch, Hewett, and Erulka (2003) found that sub-Saharan adolescent girls particularly feel pressure to conform to societal expectations. These researchers further argue that these females may modify self-reports in response to their beliefs regarding norms and their perceptions of the researcher's opinions and values. The fact that participants acted as their own controls might have helped in diminishing the effects of these biases.

Also, in assessing appropriateness of tools and intervention, the choice of a yes/no scale might have limited the sensitivity of the scale, thereby, not adequately capturing the perceptions of participants. The open-ended sections of this questionnaire did not add

much depth to the evaluation of appropriateness reflecting a weakness of using paper-pencil test to obtain in depth qualitative data. A face to face interview would have been a better approach to obtain this type of data. In future studies this aspect of the tool will have to be changed. Important aspects of measurement that might pose threats to internal validity include: reliability and validity.

Reliability refers to the internal consistency, stability, and homogeneity of variance in a tool. Internal consistencies of both scales were assessed using Cronbach's alpha. The IPSA (.99) had a higher degree of reliability than the SABS (.65). Item to total score correlations ranged from .32 to .79, with the weakest correlation being with the last item of the scale. The internal consistency of the SABS is relatively low indicating that the sample of items used to measure these variables might not have been measuring the same construct. The last item might need to be reevaluated in another sample and left out if its correlation with the total score remains low. This is a source of measurement error that might have introduced competing explanations for the results on skills, thereby lowering the internal validity.

Content validity of the tools was assessed by a panel of experts using Lynn's (1986) criteria for assessing content validity. Both scales and the appropriateness questionnaire were determined to adequately measure study variables this panel (content validity). In addition, factor analyses were performed to assess construct validity as described earlier in the methods section. Again the IPSA demonstrated a higher degree of validity with only one factor extracted with high loading on all three items. Factor analyses extracted two factors on the SAB. The first factor had moderate to high loadings from each item while the second factor had only one high item (last item on the (SABS)

loading. Again these analyses indicate that the SABS needs further refinement, if it is to be used as one scale. Furthermore, competing explanations to results obtained on sexual abstinence behavioral skills could have been introduced through this scale.

Another threat to internal validity in this study is the natural tendency for individuals who have extreme values either high or low on the scale to move close to the mean when retested or regression towards the mean (Campbell, 1969). Some participants in this study had the maximum possible values in the pretest and it is conceivable that changes in scores seen in smaller standard deviations (IPSA, $SD=4$, POSTIPSA, $SD=3.05$ and SABS, $SD=4.18$, POSTSABS, $SD=3.98$), could be reflecting the regression towards the mean phenomenon rather than the effect of the intervention.

Threats to internal validity could also have been introduced because of the testing used in the study. The study utilized a pretest and a posttest. Familiarity or experience with the test during the pretest administration might have affected score on the posttest. Students might have merely recalled the responses in the pretest and used them in the posttest. In addition the testing did not take place in a controlled environment. Participants in this study took the pretest and posttest in one room full of 60 students. The students were seated fairly close to each other. It is possible that some students could see responses of other students and might have decided to use the same responses.

Social interaction, between participants or the investigator and participants could have added threats to internal validity. Testing was done in a group setting where interactions between the participants were inevitable. It is possible that these interactions led to changes in scores on the posttest. For example some students might have discussed the questions or responses among themselves and agreed on a socially accepted response.

It is also possible that some students might have been afraid choosing some responses that might be seen by others and considered inappropriate.

Several attempts were made to limit threats to internal validity. For example using only one group pretest posttest design meant that subjects were their own controls, thereby eliminating the effects of pre-existing difference on the dependent variables. In addition, a homogenous group of the same gender and same school were used, thus minimizing heterogeneity within the group that could also contribute to rival explanations for the outcome of the study. Attempts were also made to address the sensitive nature of this topic and elicit more truthful self-report responses. However using a homogeneous group limited the external validity of the findings

By its very nature, sexual behavior is private and must be assessed using self-report measures, which may be inherently biased especially when dealing with sensitive topics. Several researchers suggest that bias could be minimized when sensitive topics are investigated by: ensuring confidentiality, emphasizing the importance of accurate responses and using self-administration rather than interviewer administration (Fowler, 1998; Jemmott et al., 1998; Mensch et al., 2003). Following these recommendations, attempts were made in this study to minimize the bias in self-report data. Strategies included 1) using code numbers instead of names on questionnaires, 2) questionnaires being deposited in a box at the back of the class and not directly to the investigator, 3) the importance of responding honestly was emphasized, and 4) participants were assured that their responses would be kept confidential.

External Validity

The use of a convenience sample in this study limited the external validity of findings. Some of the demographic characteristics of the participants suggest that this group might be different from the general population. In a country where the national unemployment rates are estimated to be around 30%, the monthly household income of participants in the study indicated that they come from more affluent homes. Participants in the study also came from homes where adults were more educated (98% versus 63%) compared to the general population. These socioeconomic characteristics limit the extent to which findings in this study are externally valid. Study findings can only be generalized to female students of the same age group, attending the same school. The study would need to be replicated with a randomly selected sample that is large and representative of preadolescent females in Cameroon to increase generalizability to this target population

Summary

HIV infections pose a serious threat to the health of young Cameroonians. The prevalence rates continue to rise at an alarming pace. Prevalence and incidence studies indicate that young women are at an increased risk for HIV infection compared to young males. They are infected at a younger age and at a higher rate than their male counterparts. Early initiation of sexual activity is implicated in the disproportionate burden borne by young females. By initiating sexual activity at an early age, young females dramatically increase their risk of HIV infection because of a number of associated factors. These include: a greater biological vulnerability per sexual act, increased risk of having sex with an older more sexually active partner, and the increased

chance of multiple partners over their lifetime. Experts have identified equipping pre-adolescent females with skills necessary to reduce their vulnerability as an effective strategy towards HIV prevention.

This study was aimed at increasing intention to postpone sexual activity and behavioral abstinence skills in preadolescent girls in Cameroon. A quasi-experimental design was used to address two dependent variables with the intervention as the independent variable. Sixty female students between the ages of 10 and 12 participated in the study. A questionnaire with scales addressing the two dependent variables was administered before and after the intervention. Findings in this study are encouraging and indicate that the intervention was effective in the short run, in increasing intentions to delay sexual activity and increasing sexual abstinence behavioral skills. However these results need to be interpreted with caution because a convenience sample was used and some threats to internal validity accompanied the study.

In spite of the limitations in the study, the study provides a solid base for other more rigorously designed studies in Cameroon, using this intervention. Findings in this study are consistent with findings in previous studies in both developing and developed countries. If these findings were replicated in larger randomized control studies in Cameroon, they would have important implications for practice and health policy. This study and similar studies could provide the basis for the development of nationwide school-based programs that could impact a majority of preadolescent females in Cameroon. Such a program if effective could avert human suffering, contribute to reversing the disturbing trend of HIV infections in the country and also be cost effective for the government.

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APPENDIX A:
Intervention Protocols

Intervention Curriculum Guide

Theme: Responsible behavior, delaying sexual intercourse

Section One: Introduction HIV Prevention Knowledge

1. Describe Human Immunodeficiency Virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS)
2. Discuss incidence in Cameroon
3. Describe modes of transmission and predominant modes in Cameroon
4. Discuss prevention strategies

Section Two: HIV prevention: Delaying Sexual Intercourse Needed Skill

Activity 1: Knowing a variety of reasons for delaying sexual intercourse until: older, in a relationship with one person, or married.

Ask: Why do young people say no? List the reasons. For example:

Fear of pregnancy,
 Fear of STD,
 Family expectations
 Religious values,
 Not ready,
 Not the right person, and
 Waiting until marriage

Ask students to prioritize good reason and provide rationale.

Activity 2: Making the decision to delay or not to delay

Provide a list of reasons why young people say yes (e.g. prove love to each other, fear that relationship will end, curiosity, belief that everyone is having sex, to be popular, money or presents etc) and a list of why people say no to sexual intercourse (e.g. fear of pregnancy, fear of STDs like HIV, fear of cervical cancer, religious values, wait until marriage etc).

Ask: How many of these reasons are good reasons. What will be 2 reasons of returning to abstinence? Have students discuss in small groups. Encourage discussion in groups

Activity 3: Student practice to responding to typical arguments that are used to pressure people to have sex

Sample of lines

You can't get pregnant the first time

You don't think I have a disease, do you?

Come on You are not a kid anymore,
 I know you want to, you're just afraid
 No one will know about it
 Everyone else is doing it

Distribute a list of five lines to each small group. Have them practice responding to these lines.

Then role play five responses and discuss verbal and nonverbal communication of role players

Examples of responses

Once is all it takes
 I have no idea, but I am not taking the risk
 I don't feel good when I am pressured, so I am leaving
 I feel OK with myself without sex
 I really don't want to have sex now
 N But I'll know about it
 Look, I am not having sex until I am older
 I know everyone is not having sex

Activity 4. Making students aware that they are not alone in delaying sex and providing guidelines to assist students

Read each suggested 'help for delaying sex' and have student rate it as easy or difficult
 Examples

Go to parties and event with a group of friends rather than alone
 Pay attention to your feeling and leave when a situation becomes uncomfortable
 Avoid secluded places where help is far away
 Avoid going out with people you cannot trust
 Get involved in extracurricular activities (sports and clubs)
 Avoid falling for romantic words
 Do not accept rides from people you do not know
 Do not accept presents from people you do not know well
 Be clear about your limits- don't give mixed messages

Ask: Which guidelines are best for students if they do not want to date

Activity 5. Practicing guidelines for delaying sex in real life situations

Communicate: Delaying sexual intercourse is not always easy but there are specific things that students can do to help them delay sex.

Provide a story and have students write specific things they would do the help them resist the temptation to have sex

“Nadine has met a boy at school who is very nice and looks attractive. He says hello to her after school. After some time he gives her small presents saying that it is for their future friendship. One day the boy invites Nadine go for a walk with him after dark. Nadine likes this boy but she is uncomfortable about the situation. However she must give him an answer after school today. How should she handle the situation?”

Ask student to use the guidelines provided in activity 4

Activity 6: Expressing affection without sex.

Have student come up with ways in small groups

Summarize list and provide examples to include

Hugging

Writing a note

Holding hand,

Giving a flower

Saying I like you

Activity 7. Deciding how far to go

Discuss how physical affection can be sexually arousing. The more sexually arousing an activity is the greater the chances that it might lead to intercourse, so it is important to know the limit

List physical affection activities from the least physical to the most physical next to sexual intercourse:

Holding hands, hugging, dry kissing, touching genitals, wet kissing, body rubbing with no clothes

Discuss

Why is it hard to stop as you get closer?

Where do you think the limit is?

Who should decide the limits?

When should the limits be decided? (key response: before beginning any physical activity)

Activity 8: Discuss passive, assertive and aggressive behaviors

Are you:

Passive

- Take no action to assert your own rights
- Put others first at your expense
- Give to what other want
- Remain silent when something bothers you
- Apologize a lot

Assertive

- Stand up for own rights without putting down the rights of other
- Respect yourself as well as others persons
- Listen and talk
- Express positive and negative feeling
- Be confident but not ‘pushy’

Aggressive

- Stand up for your own right without thought about the other person
- Put yourself first at the expense of others
- Overpower other
- Get own goal accomplished but at the expense of others

Provide two real-life stories and ask students to identify assertive, aggressive and passive person would do

Example:

It is late in the afternoon; you have not done your homework and you chores for the day. You friends come to your house and invite you to go swim with them. You really like swimming but you know that you have to stay at home and complete your chores and your home work. How would you respond to your friend if you are passive, aggressive or assertive?

Activity 9: Learning to be Assertive

Have student practice steps, by first writing responses down, and then selecting students to respond to specific real-life examples provided.

1. Explain your feeling
2. Make your request known
3. Ask how the other person feels about your request
4. Listen to their response
5. Accept with thanks

Activity 10: Responding to persuasion

Tell students: Other people will not always agree with them when they are assertive. In fact they will try to interrupt them, get them off the topic, or persuade them to do something they do not want to do. Therefore it is important to learn how to respond in these situations.

Provide student with

Ways and examples of how people disagree or try to get them off their message

- Put you down
- Argue
- Threaten
- Denial
- Provide reasons

- Get you off the topic

What to say when a person tries to persuade you to do something you do not want to do:

- Refuse
 - Say no clearly, and if necessary leave.
 - No, no, I really mean no
 - No thank you
 - No, No, And I am leaving
- Delay
 - Put off the decision until you can think clearly about it
 - I am not ready yet
 - Maybe later we can talk
 - I'd like to talk to a friend first
- Bargain
 - Try to make a decision that both people like if possible
 - Let's do --- instead
 - I won't do that, but maybe we can do---
 - Ask: what will make us both happy

Have students practice using this approach in role-plays

Divide students into small groups and provide them with a real -life story

Have them practice and select 2 people to present to rest of the group.

Activity 11. Dealing with threats of violence

Discuss: Women in particular need to be aware of situation that may lead to violent sex and of people who may put them in those situation. They need to learn ways to avoid or deal with threats to have sex.

Have student identify situation that may lead to a violent sexual encounter (Listed below)

Have students identify people that may put girls in a situation of violence (Listed below)

Have students write a list of things to do that can prevent violence thereat (Listed below)

Discuss responses

Provide a list safe behaviors such as

- Being assertive
- Avoid compromising situations
 - Not being alone with a person that makes you uncomfortable
 - Avoid flirting
 - Avoid getting physical
 - Avoid abandoned or deserted areas
 - Be assertive when someone attempts to persuade
- If already in a situation in which a threat is made

- Be assertive
- Make a phone call if possible
- Call for help
- Scream fight and kick

APPENDIX B:
Intervention Tools

*Preadolescent HIV Prevention Survey
For Cameroonian Female Students*

ID No: _____

Date: _____

Section I: Background Information

1. How old are you?
 10 11 12
2. What is your ethnic or divisional background? _____
3. I live with my
 Check one
 - a. Mother and father _____
 - b. Mother _____
 - c. Father _____
 - d. Grandparent _____
 - e. Relative _____
4. What is the age of your father? _____
5. What is the age of your mother? _____
6. What is the highest educational level of any adult living in your home?
 _____ None
 _____ Primary School
 _____ Secondary School
 _____ High School
 _____ University level or Above
 _____ Other
7. What do you think your household monthly income (in Francs CFA) is?
 Check one
 - _____ Below 20,000
 - _____ 20,000-50,000
 - _____ 50,000-100,000
 - _____ 100,000- 150,000
 - _____ 150,000-200,000
 - _____ Above 200,000

Section II: Sexual Abstinence Behavioral Skills

1. How hard or easy would it be for you to do each of these things
- a. To make sure you do not have sexual intercourse until you are older?

<i>Very easy</i>		<i>neither hard nor easy</i>		<i>Very hard</i>
1	2	3	4	5

- b. To tell somebody that you do not want to have sex with him or her?

<i>Very easy</i>		<i>neither hard nor easy</i>		<i>Very hard</i>
1	2	3	4	5

2. **Instructions: Try to imagine yourself in the following stories (even if this has never happened to you). Select the number that represents what is most likely to happen at the end of the situation**

- a. You know a boy who attends your school who is very nice to you. You have known him for about one year. Last week he waited at the back of your house and said he knew a place where the two of you could go and have a good time. You like this boy but what he is asking you to do makes you uncomfortable. What will you most like end up doing?

<i>Not go with him</i>		<i>Not sure</i>		<i>Go with him</i>
1	2	3	4	5

- b. You find yourself in a deserted area with a boy you thought was quite nice. Suddenly he is saying things and touching you in a way that makes you uncomfortable. He begins to pressure you to have sex with him. What will you most like end up doing?

<i>Not have sex</i>		<i>Not sure</i>		<i>Have sex</i>
1	2	3	4	5

- c. An unmarried man has been very nice to you and your family. Recently he has started giving you little gifts and sending money to you in secret. He wants you to come to his house and to make sure that you are alone. What will you most likely end up doing?

<i>Not go to his house</i>		<i>Not sure</i>		<i>Go his house alone</i>
1	2	3	4	5

Section III: Intentions to Postpone Sexual Activity

1. How likely is it that you will have sexual intercourse in the next three months?

Circle One Number

Very unlikely

Very likely

1 2 3 4 5

2. How would you feel about having sexual intercourse in the next three months?

Circle One Number

Dislike very much

Like very much

1 2 3 4 5

How strongly do you do plan to have sexual intercourse in the three months?

Circle One Number

Not strong at all

very strong

1 2 3 4 5

Have you ever had sexual intercourse?

Yes

No

Section IV: Open Ended Questions

1. Did any parts of the discussion today make you uneasy? Yes/No
If yes, what part?

2. Were there any parts or words of the questionnaire that were difficult to understand?
Yes/No
If yes, what are these parts or words?

3. Did you skip any questions? Yes/No
If yes, why

4. Were any parts of the discussion today helpful in changing your mind? Yes/No
If yes, what specifically helped in changing your mind?

5. Are there any topics that you think should have been covered that were not covered in the discussion? Yes/No
If yes, what are these topics?

6. Are there some questions that you expected to be asked that were not asked? Yes/No
If yes, what are the questions?

7. Are there any questions that you think should have been left out? Yes/No
If yes, what parts?

8. Did you learn any new skills? Yes/No
If yes, what did you learn?

9. Would you recommend this study to a friend? Yes/No
Why would you? Or why would you not?

10. Briefly describe any other changes you would make to the study.

APPENDIX C
Study Approval Forms



Institutional Review Board

November 19, 2003

TO: Comfort C. Enah, MSN

[REDACTED]
[REDACTED]
[REDACTED]

PROTOCOL #: 02-11-06-02-E

TITLE: Intervention to Increase Intentions and Behavioral Skills to Postpone Sexual Activity in Cameroonian Pre-Adolescent Females

The University of Cincinnati Institutional Review Board - Social and Behavioral Sciences (IRB-S) has reviewed the Progress Report for your protocol and has granted reapproval.

Reapproval is effective 11/19/2003 and expires 11/19/2004

Should your project period extend beyond this expiration date, you must submit another Progress Report to the IRB-S. You must allow sufficient time for the request for renewal to be reviewed and approved **before expiration of the current approval**. If the project is finished before the approval expiration date, you must submit a final Progress Report either at the time the project is completed or before the expiration date. The form and instructions may be found at www.med.uc.edu/irb/scontinueapp.pdf.

You are responsible for complying with all IRB-S policies, decisions, conditions and requirements. You are responsible for insuring that the research is implemented as specified in the approved protocol. Unless otherwise authorized by the IRB-S, you are responsible for obtaining and documenting informed consents in accordance with applicable Federal Regulations (45CFR Parts 46.116 and 46.117 and 21CFR Parts 50.25 and 50.27).

You must report to the Chair of the IRB-S any changes affecting the protocol upon which this certification is based. **No changes may be made without prior approval by the Board** except those necessary to eliminate immediate hazards..

Sincerely,

[REDACTED]
Margaret Miller, Ed.D., RN
Chair, UC Institutional Review Board -
Social and Behavioral Sciences

cc: Marilyn R. Sommers, PhD (ML0038)



Institutional Review Board

December 19, 2002

TO: **Comfort C. Enah, MSN**
Chem/biol Library

PROTOCOL #: **02-11-06-02-E**

TITLE: **Intervention to Increase Intentions and Behavioral Skills to Postpone Sexual Activity in Cameroonian Pre-Adolescent Females**

The Institutional Review Board - Social and Behavioral Sciences of the University of Cincinnati has reviewed your protocol and has granted approval.

Approval is effective 12/12/2002 and expires 12/12/2003


Should your project period extend beyond this expiration date, you must submit a Progress Report to the IRB-S. You must allow sufficient time for the request for renewal to be reviewed and approved **before expiration of the current approval**. If the project is finished before the approval expiration date, you must submit a final Progress Report either at the time the project is completed or before the expiration date. The form and instructions may be found at www.med.uc.edu/irb/scontinueapp.pdf.

You are responsible for complying with all IRB-S policies, decisions, conditions and requirements. You are responsible for insuring that the research is implemented as specified in the approved protocol. Unless otherwise authorized by the IRB-S, you are responsible for obtaining and documenting informed consents in accordance with applicable Federal Regulations (45CFR Parts 46.116 and 46.117 and 21CFR Parts 50.25 and 50.27).

You must report to the Chair of the IRB-S any changes affecting the protocol upon which this certification is based. **No changes may be made without prior approval by the Board** except those necessary to eliminate immediate hazards..

Sincerely,

cc: Marilyn Sommers, PhD (ML 0038)


 Margaret Miller, Ed.D., RN
 Chair, Institutional Review Board - Social and Behavioral Sciences Committee

APPENDIX D
Study Consent Forms

Assent to Participate in a Research study
College of Nursing

Email Address: [REDACTED]

Title of Study: HIV Prevention In Preadolescents: Testing an Intervention to Promote Postponement of Sexual Activity in Cameroonian Preadolescent Females

It is important that you read all the information below, before you agree to participate in this study. It describes what will happen during the study and your right to withdraw at any time.

We would like to invite you to take part in this study. We are asking you because you attend this school, you are a female, and you are 10-12 years old. About 80 female students from your school will also take part in this study.

In this study we will show you skills that may help you refuse sex. We will share skills using role-plays and discussions in which we will ask you to participate. We will be sharing these skills with you during a period of about three hours on a Saturday morning. We will also give you a paper-and-pencil test before and after we show you these skills. This test will last about thirty minutes each time. Your name will not appear on the tests. Only a code will identify the information you provide. The information we gather from this study will help us in coming up with new ways to try to prevent HIV infections in children of your age group.

We do not think that you will risk or discomfort by taking part of this study. However, length and day of the study may be an inconvenience.

All information you share with us during this time will be kept confidential. We will provide you with a list of people you can talk to, if you feel the need to talk to someone about HIV or if you would like some counseling and testing.

We will also ask your parent to give their permission for you to participate in the study. You do not have to be in this study if you do not want to. If you decide to participate in the study, you can also stop at any time.

If you have any questions at any time during the study, please ask us.

If you sign this form, it means that you have decided to participate and have read everything on this form. We give you a copy of this form, to you to give to your parents

Signature of Subject

Date

Signature of Investigator

Date

University of Cincinnati
Parental Informed Consent to Participate in a Research Study
College of Nursing
Email Address: [REDACTED]

Title: HIV Prevention In Preadolescents: An Intervention to Promote Postponement of Sexual Activity in Cameroonian Preadolescent Females

We are asking your permission to allow your child to participate in this research study. It is important for you to read all the information below before you decide. If you have any questions please do not hesitate to ask.

We are asking your child to participate in this study because she attends this school, she is a female, and she is 10-12 years old. About 80 female students from her school will also take part in this study.

The purpose of this study is to test whether providing children of this age with specific information and skills increase their intentions to delay sex and their skills to refuse sex.

The study will take approximately four hours of your child time on a Saturday. Students agreeing to participate will be divided into two groups. We will share specific skills with one group, and use the other group for comparison. As part of the study your child may take a paper-and-pencil test before and after we share the specific skills. Your child may also take the both tests before these skills are shared with her. Your child's name will not be included on any of these tests materials. Only code numbers will be used to identify the information provided by your child. The study will also include discussions, and

role-playing sessions in which your child will participate. The content of all of these activities will focus on ways of thinking and behaving that can help children delay sex.

There are no known risks associated with this study. The study does not affect your child's normal school activities. There might be some inconvenience due the requirement to be in school for about four hours on a Saturday.

As a result of participating in this study, it is possible that your child may learn skills to delay sex. However, it is also possible that they may not learn anything new. The information obtained from this study will help us develop programs that can better assist 10-12 year old children in this country to delay sex and protect themselves from this terrible disease.

No information obtained in this study will be linked to your child. The information obtained in this study may be shared with others in the form of presentations and journal article but only the school will be identified.

You are free to decide not to enroll your or to withdraw your child at any time without adversely affecting your child schooling. Your decision will not result in any changes to your child's treatment at school.

You are voluntarily making a decision whether or not to allow your child to participate in this research study.

Students Name

Signature of parent

Date

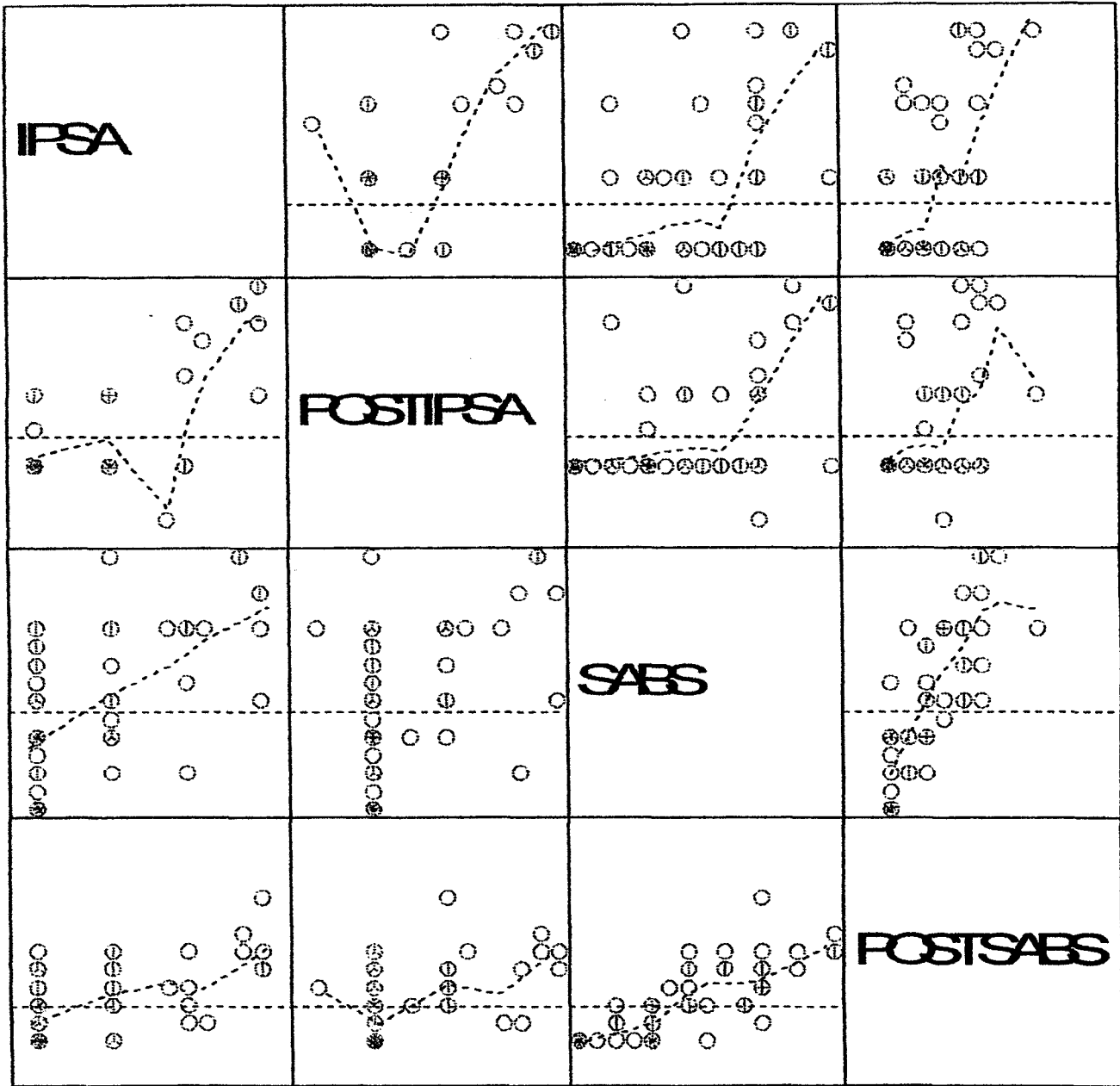
Check for verbal consent

Witness

If you have any questions at any time, please feel free to contact the school or call
Comfort Enah, MSN, RN, or any of the study staff at [REDACTED]

APPENDIX E

Scatter plot matrices with LOWES smoothing of dependent variables



APPENDIX F
Formulae Used in Study

1. Effect size: $ES = \frac{\mu_t - \mu_c}{\hat{\sigma}\sqrt{1-r}}$

Where μ_t = Mean of posttests

μ_c = Mean of pretests

$\hat{\sigma}$ = Common standard deviation

r = Correlation between pre and posttests

2. Confidence intervals on effect sizes at 95% confidence interval (Hedges & Olkin, 1985)

$$d - 1.96 \times \hat{\sigma} [d] \text{ to } d + 1.96 \times \hat{\sigma} [d]$$

$$\hat{\sigma} [d] = \sqrt{\frac{(N_e + N_c)}{N_e \times N_c} + d \times d / 2(N_e + N_c)}$$

Where N_e and N_c are the number of participants at baseline and follow-up, and d is the effect size.