**HIV Prevention Literature Review I:**

**Adolescents & Young Adults in Low- and Middle-income Countries**

**Draft 3**

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*by Dr. Allison Ruark, Consultant*

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**Acronyms & abbreviations**

ABC Abstain, be faithful, use condoms

aHR Adjusted hazard ratio

ANC Antenatal care

aOR Adjusted odds ratio

ASRH Adolescent sexual and reproductive health

AIDS Acquired immunodeficiency syndrome

ART Antiretroviral treatment

ARV Antiretroviral

BCC Behavior change communication

CCT Conditional cash transfer

GBV Gender-based violence

HIV Human immunodeficiency virus

HCT HIV counseling and testing

HR Hazard ratio

IDU Injecting drug user

IGA Income-generating activity

IPV Intimate partner violence

IRR Incidence rate ratio

KI Key informant

MSM Men who have sex with men

OR Odds ratio

PMTCT Prevention of mother-to-child transmission

PrEP Pre-exposure prophylaxis

PWID Person/people who injects drugs

RCT Randomized controlled trial

RR Risk ratio

SRH Sexual and reproductive health

STI Sexually transmitted infection

TasP Treatment as prevention

UNAIDS Joint United Nations Programme on HIV/AIDS

VMMC Voluntary medical male circumcision

WHO World Health Organization

# Executive Summary

Of the 35 million people worldwide living with HIV, nearly 5 million are young people aged adolescents aged 10 to 24 years. More than 80% of the world’s HIV-positive adolescents (ages 10-19) live in sub-Saharan Africa, and in some countries more than 80% of new infections among adolescents aged 15-19 are among girls. Adolescents are placed at risk of HIV through early sexual debut, multiple partners, lack of condom use, transactional or coerced sex, inter-generational sex, sex under the influence of alcohol or drugs, and injecting drug use. Girls and young women face particular risk due to less access to sex education, unequal gender norms, inability to enforce condom use, and risk of coerced, forced, and age-disparate sex. While significant declines in HIV and sexual risk behaviors were seen among adolescents in a number of countries during the 2000s, adolescents continue to be infected at high rates, to lag behind other age cohorts in terms of treatment access and adherence, and to experience greater HIV-related mortality.

The objective of this literature review was to review the evidence for interventions which address HIV risk among young people aged 10 to 24 years in low- and middle-income countries. Interventions were included which attempted to show impact on one of the following four areas: 1) transmission of HIV and other STIs; 2) support of HIV treatment for young people living with HIV; 3) sexual behavior change including delayed sexual debut, abstinence, partner reduction/faithfulness, and condom use; and 4) gender-based violence including forced sex, sexual violence, inter-generational sex and transactional sex. In total, 84 articles were reviewed, and categorized according to the following modalities: 1) health systems and facility-based approaches; 2) community-based provider-led approaches; 3) health behavior change communication approaches; and 4) integrated and multi-sectoral socio-economic approaches. A number of articles were also included in this review which addressed family and parental influence on youth sexual behavior, or HIV prevention interventions which addressed parent-child relationships or communication.

Health systems and facility-based approaches included youth-friendly clinics, voluntary medical male circumcision (VMMC) for young men, and support of HIV-positive young people taking ART. Youth-friendly clinics have generally not shown evidence of effectiveness, and support for such an approach has waned in the last decade. VMMC has been particularly targeted at, and disproportionately adopted by, young men, as both an HIV prevention intervention and a “lifestyle choice”. While some examples exist of effective youth-oriented adherence support programs, the barriers to adherence for young people remain significant, and tailored interventions for youth are urgently needed. Two studies were also identified which provided ART adherence support through community-based provider-led approaches.

Health behavior change communication approaches have been implemented and evaluated for decades, and have shown effect on a variety of outcomes, including HIV knowledge, condom use, primary and secondary abstinence, and number of sexual partners, although the evidence for impact on abstinence and number of sexual partners has been mixed. In-school, curriculum-based interventions led by adults have shown some of the strongest evidence of impact. Evidence of impact on biological endpoints, including STI and HIV infection, has been largely lacking for all behavior change approaches.

Integrated and multi-sectoral socio-economic approaches have received significant investment in the last decade. Several trials have shown success in keeping girls (including orphans) in school and reducing teen pregnancies, through cash transfers, provision of school uniforms, and/or psychosocial support. One microfinance intervention showed reductions in intimate partner violence (IPV), while another showed reductions in transactional sex. Two cash transfer programs have shown impact on HIV incidence, while one has reduced incidence of HSV-2.

The findings from this review demonstrate that while the search for highly effective HIV prevention approaches for adolescents and young adults continues, to date there is no silver-bullet, iron-clad prevention intervention (or even package of interventions) which has been unequivocally proven to reduce HIV risk for all groups of young people in all contexts. Rather, the evidence to date suggests that while a variety of HIV prevention approaches have shown effect on various outcomes, the effectiveness of interventions is often partial, inconsistent between studies, and highly context-specific. These realities should perhaps cause a re-examination of older interventions, such as behavior change interventions, which while not on the cutting edge of prevention science, have proved their worth over time.

# Introduction

Of the 35 million people living with HIV worldwide, 7 million are youth and children under the age of 25 (UNAIDS, 2014)[[1]](#footnote-1). Adolescents aged 10 to 19 years account for an estimated 2.1 million HIV infections (Idele et al., 2014), and young adults aged 20 to 24 account for an estimated 2.8 million infections (UNAIDS, 2014), meaning that nearly 5 million young people between the ages of 10 and 24 are living with HIV. Approximately 300,000 new HIV infections occur annually among adolescents aged 15-19 years, based on 2012 estimates (Idele et al., 2014). Globally, two-thirds of these infections are among girls, but in some countries more than 80% of new infections are among girls (Idele et al., 2014). The burden of adolescent HIV is concentrated in sub-Saharan Africa, with 82% of the world’s HIV-positive adolescents living in this region, particularly in the countries of southern Africa (Idele et al., 2014). Meanwhile, in low and concentrated epidemic countries, HIV infections disproportionately occur among adolescents who are members of key populations, especially men who have sex with men, injecting drug users, and adolescents who are sexually exploited (Idele et al., 2014). Compared to children and adults, there is a relative lack of data about HIV among adolescents, and data are often no disaggregated for this age group (Idele et al., 2014).

Adolescence and young adulthood are critical times of life in which attitudes, behaviors, and lifestyles are established which will affect health and well-being throughout the life-course (Kapogiannis & Legins, 2014). Adolescents face critical development tasks such as formation of identity and self-esteem, social and psychological pressures, and the advent of adult roles and responsibilities which may include income generation and caring family members (Kapogiannis & Legins, 2014). Girls and young women face particular contexts of risk, including being forced into marriage or unwanted sexual experience. All of these factors may place young people at risk of behaviors which carry risk of HIV infection, including early sexual debut, multiple partners, lack of condom use, transactional or coerced sex, inter-generational sex, sex under the influence of alcohol or drugs, and injecting drug use (Kapogiannis & Legins, 2014). In addition, large number of perinatally infected children are now surviving into adolescence (Lowenthal et al., 2014), and may experience unique challenges including chronic immunosuppression, impaired neurocognitive development, delayed sexual maturation, and long-term adverse effects of ART such as cardiovascular disease (Adejumo, Malee, Ryscavage, Hunter, & Taiwo, 2015). In addition, perinatally infected HIV-positive adolescents have generally been found to exhibit emotional and behavioral problems at higher rates than their peers (Mellins & Malee, 2013).

Risky sexual behaviors such as early sexual debut, multiple sexual partners, and lack of condom use put adolescents at risk of HIV infection (Idele et al., 2014). Yet some gains have been seen in HIV prevention for young people in the countries most affected by HIV (Gouws, 2010). Of the 21 most-affected countries included in the review (19 of them in Africa), in the period 2000 to 2008, 11 showed statistically significant HIV prevalence declines among young women attending antenatal care (ANC), 7 showed declines of 25% or more among women attending ANC, and 5 countries showed a significant decline in HIV among young men or young women in national surveys (Gouws, 2010).

Furthermore, in 8 countries with significant declines in HIV prevalence, significant changes were also seen in sexual behavior among young men or young women (Gouws, 2010). Statistically significant declines in the proportion of young women reporting first sex by age 15 were seen in 8 countries, and among young men in 7 countries. Statistically significant declines in the proportion of young women reporting multiple partners in the past 12 months were seen in 7 countries, and among young men in 10 countries. Among young women who reported multiple partners in past 12 months, a statistically significant increase in the proportion reporting condom use at last sex was seen in 6 countries, and for men, in 5 countries. More recent data have additionally shown that between 2000 and 2012, condom use at last sex among adolescents reporting multiple sexual partners increased by at least 10 percentage points in approximately half of the low- and middle-income countries included in a UNICEF survey (Idele et al., 2014).

## HIV treatment and adherence

Although precise figures are not available, more than a million adolescents living with HIV in low- and middle-income countries are in need of ART according to an eligibility criterion of CD4 <500 (Idele et al., 2014). Accurate estimates for ART coverage of adolescents are also lacking, but ART coverage of children aged 0 to 14 years (among those eligible for treatment) was 34% in 2012, compared to 64% coverage of adults (Idele et al., 2014), suggesting that treatment of adolescents is lagging far behind that of adults. From 2005 to 2012, AIDS-related deaths among adolescents are estimated to have increased by more than 50% even while decreasing among all other age groups (Idele et al., 2014). Globally, HIV ranks second among causes of adolescent deaths (Adejumo et al., 2015).

Suboptimal adherence to ART may play a significant role in high AIDS mortality among youth in sub-Saharan Africa, where approximately 80% of the world’s HIV-infected adolescents live (Adejumo et al., 2015). ART adherence is poorer among older adolescents than among other age groups (Adejumo et al., 2015), although a meta-analysis found that adherence was higher among adolescents in Africa and Asia than among adolescents in North America and Europe (S.-H. Kim, Gerver, Fidler, & Ward, 2014). Low adherence is a particular concern in low-resource settings because of the limited ART options available and the risk of drug resistance (Adejumo et al., 2015). A 2009 study of ART adherence and virologic suppression among adolescents (aged 11 to 19) and adults in southern Africa found that adolescents had lower adherence, lower rates of virologic suppression, and worse outcomes in response to treatment (Nachega et al., 2009). A review of perinatally-infected adolescents in sub-Saharan Africa noted their distinctive medical and psychosocial issues, including maintaining ART adherence and negotiating sexual relationships while navigating the changes that come with adolescent development, and recommended that clinical HIV care for this group include integrated age-appropriate ASRH, psychological, educational and social services (Lowenthal et al., 2014).

Poor adherence behaviors can be influenced by psychosocial, socio-economic, individual, and treatment-related factors (Adejumo et al., 2015; Mavhu et al., 2013). At an individual level, positive attitudes, high levels of cognitive functioning, good psychological adjustment, and positive future expectations are known to help young people cope successfully with a diagnosis of HIV, and may also be linked to successful ART adherence (Adejumo et al., 2015). Yet adolescents are particularly prone to impulsive behavior and immature judgment, mental health problems such as depression and anxiety, and negative peer influence which may negatively impact ART adherence (Adejumo et al., 2015). Diminished caregiver involvement in ART adherence with increasing age may also impact adherence (Adejumo et al., 2015), and there is some evidence that adherence may be lower for older children and adolescents compared to younger children (Bygrave et al., 2012; Dachew, Tesfahunegn, & Birhanu, 2014).

Qualitative research has also highlighted the importance of caregiver adherence support for children and adolescents (Bikaako-Kajura et al., 2006; Vreeman et al., 2009). The transition to taking responsibility for their own treatment—rather than relying on caregiver involvement—may be complicated by adolescents’ desire for peer acceptance, stigma, socioeconomic challenges, and treatment fatigue (Adejumo et al., 2015). Young people who are horizontally infected and initiating ART for the first time may fail to recognize their need for medications, struggle to remember to take them or to successfully take large numbers of pills (“pill burden”), fear disclosing their status, suffer from poor social support or mental health issues, or be negatively impacted by involvement in substance abuse and other risky behaviors (Adejumo et al., 2015). At an economic and structural level, lack of nutritious food, inability to pay treatment fees, and distance from treatment facilities have all been linked to poor ART adherence among young people in African contexts (Adejumo et al., 2015).

Disclosure is a particular issue for HIV-infected adolescents which also has implications for ART adherence. First, adolescents face the challenge of disclosing their HIV status to those in their social environment, such as friends or sexual partners. Second, many adolescents have not had their HIV status fully disclosed to them. Research in African contexts has found that only a minority of children and adolescents have been fully informed about their HIV status by caregivers (Bikaako-Kajura et al., 2006; Menon, Glazebrook, Campain, & Ngoma, 2007), and that ART adherence was poorer for children and adolescents who had not been fully disclosed to (Arage, Tessema, & Kassa, 2014; Bikaako-Kajura et al., 2006; Dachew et al., 2014; Menon et al., 2007; Nabukeera-Barungi, Kalyesubula, Kekitiinwa, Byakika-Tusiime, & Musoke, 2007). One group of researcher suggested that children might be intentionally missing ART dosages in protest against not being given full information (Bikaako-Kajura et al., 2006).

Stigma is an additional barrier to ART adherence among young people. Caregivers may avoid telling children or adolescents about their HIV status because they fear exposing them to stigma (Hejoaka, 2009; Kenu et al., 2014; Mburu et al., 2014). Furthermore, stigma may cause young people to not take medications at the proper times if there are others present who might observe, or simply because they do not like feeling different than their peers (Biadgilign, Deribew, Amberbir, & Deribe, 2009; Fetzer et al., 2011; Mutwa et al., 2013).

## HIV and violence among girls and young women

Girls and young women are particularly vulnerable to HIV due to less access to sex education (and education generally) compared to males, unequal gender norms, inability to enforce condom use, and risk of coerced, forced, and age-disparate sex (Dellar, Dlamini, & Abdool Karim, 2015; Hardee, Gay, & Croce-Galis, 2014a; Harrison, Colvin, Kuo, Swartz, & Lurie, 2015). Girls are at greater of emotional, physical, and sexual violence during childhood and adolescence than are boys, and this violence is linked to negative health outcomes including sexual risk behaviors such as inconsistent condom use and increased number of sexual partners (Sommarin, Kilbane, Mercy, Moloney-Kitts, & Ligiero, 2014). Globally, between 5% and 21% of girls aged 15-19 years report that they have ever experienced sexual violence, but “little programming [for GBV] has been developed and evaluated for adolescents in developing countries” (Hardee et al., 2014a). Dellar and colleagues similarly note, “Despite the large and immediate HIV prevention need of adolescent girls and young women, there is a dearth of evidence-based interventions to reduce their risk” (Dellar et al., 2015, p. 64). Several HIV prevention interventions have been aimed specifically at women, including vaginal microbicides, pre-exposure prophylaxis, and structural interventions such as conditional cash transfers (CCT), but the efficacy and feasibility of these interventions is still being proven (Harrison et al., 2015).

A 2013 systematic review of gender-based HIV interventions in sub-Saharan Africa identified 11 studies of 8 interventions which met an inclusion criterion of evaluating outcomes related to HIV (including biological and behavioral outcomes, HIV risk, violence) (Small, Nikolova, & Narendorf, 2013). Only 2 of these interventions targeted young adults: the Stepping Stones trial, which targeted women and men aged 15 to 26 years (Jewkes, Dunkle, Nduna, & Shai, 2010), and the SHAZ! trial, which targeted women aged 16 to 19 years (Dunbar et al., 2014). Both of these trials will be described in Section 5.4. Hardee and colleagues cast a broader net in identifying “key social and structural drivers of HIV”, and six factors which can create an “enabling environment” for women and girls: transforming gender norms; addressing GBV; transforming legal norms; promoting women’s employment, income & livelihood opportunities; advancing education for girls; and reducing stigma and discrimination (Hardee, Gay, Croce-Galis, & Peltz, 2014b). The evidence for interventions related to each of these strategies is rated as “successful” or “promising”. The authors identified 64 studies of 19 interventions, and designate these interventions as “successful” or “promising”. Those interventions which fall within the scope of this review (in geographical area, time period, and in being targeted at young adults) are discussed in this review.

# Objectives

The objective of this literature review was to review the evidence for interventions which address HIV risk among young people aged 10 to 24 years in low- and middle-income countries. Interventions were included which attempted to show impact on one of the following four areas:

* Transmission of HIV and other STIs
* Support of HIV treatment for young people living with HIV
* Sexual behavior change including delayed sexual debut, abstinence, partner reduction/faithfulness, and condom use
* Gender-based violence including forced sex, sexual violence, inter-generational sex and transactional sex

The central research question addressed by this review is: *What interventions and approaches are most successful in supporting adolescents and youth to protect themselves from HIV and in reducing of incidence of HIV among adolescents and youth in low income and low middle-income countries?*

# Methods

A search was carried out using Google Scholar and combinations of the search terms ‘HIV *or* AIDS’, ‘adolescent *or* youth’, ‘Africa’, ‘effectiveness *or* evaluation *or* impact *or* result’. Articles from January 2006 through October 2015, which addressed young people in low- or middle-income countries, were included. The reference lists of included articles, particularly reviews and meta-analyses, were also searched. Conference presentations and gray literature (such as program reports) were included in cases in which the data had not appeared in the peer-reviewed literature. Research was included if it included young people aged 10-24, although in some cases the study population extended beyond this age range. Reviews, meta-analyses, and commentaries related to HIV prevention for young people in low- and middle-income countries were also included. Articles related to young key populations are not reviewed here but will be included in a future literature review addressing key populations.

Sources are discussed in the text, as well as presented in the a Table of Sources in Appendix 1 according to the following HIV prevention modalities:

1. Health systems and facility-based approaches
2. Community-based provider-led approaches
3. Health behavior change communication approaches
4. Integrated and multi-sectoral socio-economic approaches

# Findings

In total, 84 articles and reports were included in this review, including 19 reviews and meta-analyses, 2 commentaries, and 63 peer-reviewed articles, conference presentations, and reports presenting findings from HIV prevention interventions. The vast majority of interventions were in sub-Saharan Africa. This reflects the fact that young people in sub-Saharan Africa are at much greater risk of HIV infection than young people in other regions of the world. Outside of sub-Saharan Africa, young people are at very low risk of HIV infection unless they are members of key populations such as injection drug users, men who have sex with men, or sex workers.

A clear progression was noted in the literature reviewed, from a focus on behavior change communication interventions in the early 2000s, to socio-economic approaches and cash transfer interventions in the late 2000s and early 2010s, to more recent interventions to support young people in anti-retroviral treatment (ART). While significant investment was made in providing comprehensive ASRH services through youth-friendly clinics in the early 2000s, notably through the Bill and Melinda Gates Foundation, which funded hundreds of youth-friendly clinics across four African countries (John Snow International, 2007), this strategy has more recently been eclipsed by new initiatives to make health facilities more accessible and friendly for young people taking ART.

In the 2010s, the emphasis in HIV prevention has also shifted to combination prevention, or synergistic integration of behavioral, biomedical, and structural components (Cowan et al., 2010; Padian, McCoy, Balkus, & Wasserheit, 2010). The advent of combination prevention complicates the task of evaluating specific HIV prevention approaches. For example, a recent evaluation of HIV incidence and risk factors among youth in rural south-central Uganda found that “substantial declines” occurred in sexual experience, multiple partners, and sexual concurrency from 1999 to 2011 (Santelli et al., 2015). Declines in HIV incidence were also seen in this cohort, among adolescent women aged 15-19, although not among young men or women aged 20-24. These positive changes in behavior and HIV incidence were attributed to increases in school enrolment, decline in adolescent marriage, availability of ART, and increases in medical male circumcision. In other words, successful prevention of HIV infections in this cohort was due to a combination of factors, ranging from the sociocultural to those specifically targeted by HIV prevention and treatment interventions. The positive behavior changes noted in this cohort continue the success of Uganda’s earlier ABC approach, which has also been described as multi-sectoral and far broader than most HIV prevention interventions (Green, Halperin, Nantulya, & Hogle, 2006; Kirby, 2008; Okware, Opio, Musinguzi, & Waibale, 2001).

A number of reviews and meta-analyses will be discussed in the sections that follow, but a “systematic review of systematic review” is presented here because of its relevance across all the HIV prevention approaches in this review. Mavedzenge and colleagues (2014) examined the evidence for an *a priori* list, compiled by global experts, of 20 interventions that might reduce HIV transmission risk, morbidity, and mortality. Eight of these interventions were specifically designed for adolescents and young adults, while the remaining 12 were designed primarily for adults but have potential application to adolescents and young adults. Effectiveness of these interventions was evaluated according to impact on HIV risk, HIV transmission, and HIV morbidity and mortality. In cases in which evidence was not available for these criteria (particularly the case for many adolescent-focused interventions, which have often not had biolotical endpoints), or was not conclusive, other evidence was considered: knowledge, sexual behavior, self-efficacy, attitudes, and uptake of health services.

The results of this analysis are summarized in Table 1, with the recommendations offered by the authors based on a combination of evidence of effectiveness and quality of evidence, but not taking into consideration feasibility, cost, potential size of benefit, risk of harm, acceptability, or other social health benefits. (The full results as presented in the article are in many cases considerably more complex and nuanced; Table 1 presents only a brief summary.)

Table 1: HIV prevention interventions for young people, from Mavedzenge et al. 2014

|  |  |
| --- | --- |
| **Intervention** | **Recommendation(s)** |
| *Interventions designed specifically for adolescents*  |
| 1. In-school HIV **prevention education**
 | Recommended: curricula-based interventions delivered by trained adult facilitatorsNot recommended at this stage: Abstinence-only and peer-led interventions |
| 1. Delivery of services (e.g. testing, condoms) in **youth centers**
 | Not recommended at this stage |
| 1. Increasing adolescents’ use of HIV prevention interventions (e.g. HIV testing, condoms) by **making health services more adolescent friendly** (e.g. increased privacy, youth-friendly hours, staff trained to work with adolescents)
 | Shows promise (based on uptake of services)Not recommended at this stage (based on reported behavior change outcomes) |
| 1. **School-based health services**
 | Not recommended at this stage |
| 1. **Community-wide interventions** within geographically defined communities
 | Recommended for interventions targeting youth and creating their own system or structure for deliveryShows promise for other types of interventions |
| 1. **Conditional cash transfers (CCTs) to adolescents who stay in school**
 | Shows promise |
| 1. **CCTs to adolescents who remain STI free**
 | Not recommended at this stage |
| 1. **Unconditional cash transfers (UCTs)** to adolescents
 | Shows promise |
| *Interventions designed primarily for adults* |
| 1. **Voluntary medical male circumcision**
 | Recommended |
| 1. Antiretrovirals for the **prevention of mother-to-child transmission** of HIV
 | Recommended |
| 1. **HIV testing and counselling**
 | Lack of evidence for HIV prevention impact, but required to access HIV care, support, & treatment |
| 1. **HIV treatment**
 | Recommended |
| 1. **Condom use**
 | Recommended |
| 1. Provision of **opioid substitution therapy** to people who inject opioid drugs
 | Recommended |
| 1. Provision of **clean injecting equipment** to people who inject drugs (PWID)
 | Recommended for needle & syringe exchange programsShows promise for supervised injecting centers |
| 1. **Oral pre-exposure prophylaxis** (PrEP)
 | Recommended for heterosexual couples and MSM |
| 1. **Topical PrEP** (microbicides with antiviral activity against HIV) for the general population of women and for men who have sex with men (MSM)
 | Shows promise for general population of women |
| 1. Individual and group **behavior change interventions among 3 key populations** (MSM, PWID, and sex workers)
 | Range of recommendations (recommended to not recommended) depending on population and type of intervention  |
| 1. **Sexually transmitted infection (STI) screening and treatment among 3 key populations** (MSM, PWID, and sex workers)
 | Shows promise |
| 1. **Mass media interventions**
 | Recommended |

Mavedzenge and colleagues recommend a number of adolescent-specific HIV prevention interventions, in spite of lack of evidence of impact on biological outcomes such as HIV and STI incidence and pregnancy. Specifically, they recommend in-school HIV prevention education that is curricula-based, involves multiple sessions and skills and knowledge-building activities, is delivered by trained adult facilitators (and not by peer educators), and is tailored to the local context. Youth centers offering information and services were not found to be an effective modality for HIV prevention, and youth-friendly health care facilities showed weak evidence of influencing sexual behaviors. Community-level interventions were judged to show promise, and those which created their own system or structure for delivery were recommended. Based on the limited and equivocal data available at the time on cash transfers (conditional and unconditional), such interventions were judged to have promise, but requiring further research.

A number of interventions show evidence of efficacy among adults, and are recommended by the authors, namely VMMC, PMTCT, HCT, HIV treatment, condom use, opioid substitution therapy, provision of sterile injecting equipment to those who inject drugs, PrEP (for heterosexual couples and MSM), and mass media recommendations. Yet the authors also conclude that the evidence for extending these interventions to adolescents is “modest”, and that adolescents face unique barriers to access for many of these interventions. More research is needed to understand these barriers, and how adolescents may better access effective HIV prevention interventions.

There is widespread consensus that additional research is urgently needed on contexts of risk for young adults, and on effective interventions for this population. Kapogiannis and Legins state (2014, S228), “To address the HIV epidemic in adolescents and adolescent health overall, a more focused, efficient, and effective global response to the needs of adolescents is an increasing priority within the global health agenda.” Chandra-Mouli et al. (2015) point to the gap between research and implementation regarding ASRH generally, arguing that interventions fail to reach the adolescents they are intended for, ineffective interventions continue to be implemented, and effective interventions are delivered ineffectively, piecemeal, and with inadequate intensity and duration.

## Health systems & facility-based approaches

Three types of health facility-based interventions will be discussed in this section: youth-friendly clinics, voluntary medical male circumcision (VMMC) for young men, and support of HIV-positive young people taking ART.

### Youth-friendly clinics

The largest and best-evaluated network of youth-friendly clinics was established by the African Youth Alliance program, which established youth-friendly clinics in Botswana, Ghana, Tanzania, and Uganda (John Snow International, 2007). From 2000 to 2006, dozens of youth-friendly clinics operated in each country, and the intervention included training for clinic staff, peer educators who worked in the clinic and community, community-based behavior change programming, a media campaign, and activities such as sports and drama clubs. The target audience was youth aged 17-22 years, and the goals of the intervention were to increase access to ASRH services, increase contraceptive use, and influence sexual behaviors in the community (sexual debut, condom use, and number of sex partners). The programs in Ghana, Tanzania, and Uganda were evaluated, but the evaluations lacked an experimental design and were never published in peer-reviewed literature. Mavedzenge et al. (2011) report in their systematic review that although young people (especially young women) in intervention sites had less risky sexual behavior on a number of measures, compared to those in control sites, in all three countries, overall the quality of most of the evidence was “not strong”.

### Voluntary medical male circumcision (VMMC)

The 2011 WHO/UNAIDS Joint Strategic Action Framework to Accelerate the Scale-Up of VMMC for HIV Prevention called for particularly targeting adolescent men in VMMC scale-up through strategies such as age-appropriate delivery packages, integration into youth-friendly sexual and reproductive health services, and linkages with other youth-focused programs (WHO/UNAIDS, 2011). Adolescents have been particularly targeted with VMMC services in 14 VMMC target countries of East and Southern Africa (Njeuhmeli et al., 2014). Young men between the ages of 10 and 19 have fewer social and cultural barriers to VMMC compared to adult men, in part because male circumcision is part of coming-of-age ritual for adolescent boys in many African cultures. Adolescents reap longer-term benefits to VMMC at the individual level, compared to older men, which also maximizes benefits of VMMC at the population level. Furthermore, adolescents who are not yet sexually active are also ideal candidates for VMMC as they do not face barriers to sexual abstinence during healing as do sexually active adults. In the VMMC target countries, average age of sexual debut is around 18, but approximately a quarter of young men were sexually active by age 15, demonstrating the need to target young men for VMMC during early adolescence (Njeuhmeli et al., 2014).

A review of VMMC scale-up noted that of the 6 million men who had received VMMC in the 14 East and Southern Africa priority countries by December 2013, the majority were adolescents, and rates of VMMC were higher among uncircumcised adolescents than among older age cohorts (Njeuhmeli et al., 2014). Research into country VMMC programs found that adolescents often accessed VMMC during school holidays (making the 6-week recovery period less onerous) and were receptive to campaigns that focused on role models and peer influence in support of VMMC as well as to support from teachers, headmasters, and parents (Njeuhmeli et al., 2014). Some communication campaigns have also had success through positioning VMMC not as an HIV prevention intervention, but as a “lifestyle choice” that prepares boys for adulthood (Njeuhmeli et al., 2014).

### ART adherence support

A review of ART adherence among young people in sub-Saharan Africa concluded, “In the sub-Saharan African region, few programmes for improving ART adherence exist for adolescents, and there is a dearth of research into the efficacy of interventions for this age group” (Adejumo et al., 2015, p. 11). The authors also state that adolescents “likely require tailored interventions to improve adherence behavior”. A systematic review of service delivery interventions to improve adolescents’ linkage, retention and adherence to ART and HIV care identified only two such studies from developing countries, and similarly concluded that there is “limited evidence on the effectiveness of service delivery interventions to support adolescents’ linkage from HIV diagnosis to ART initiation, retention on ART, and adherence to ART” (MacPherson et al., 2015, p. 1015).

One of these two studies, a pilot RCT carried out at two hospitals in South Africa (the VUKA study), showed positive results (Bhana et al., 2014). A 6-session intervention of 3 months’ duration was offered to pre-adolescents and their families, with multiple families per group. Trained lay counselors (supervised by a psychologist) deliver a culturally-tailored curriculum which involves discussion and problem-solving within and between families. The curriculum is based on a cartoon storyline centering around a 12-year old boy who is orphaned by HIV, goes to live with relatives, and learns about his HIV status and treatment needs while confronting issues of family loss, stigma, relationship with peers and family, and identity. In the pilot study, participants improved in all dimensions measured compared to control group, including ART adherence, mental health, youth behavior, HIV treatment knowledge, stigma, and communication, and changes in ART adherence.

A larger, multi-country evaluation had somewhat mixed findings. In an evaluation of clinic and patient data from 160 clinics in four African countries, attrition before and after ART initiation was found to be higher for youth aged 15 to 24 years compared to younger and older age cohorts (aHR = 1.50, 95% CI = 1.45-1.54 & aHR = 1.59, 95% CI = 1.52-1.67, respectively, compared to adults aged 25-54) (Lamb et al., 2014). Neither adolescent-targeted services (dedicated adolescents clinics and opening hours, peer educators, or support groups) or services likely to be used by youth (clinics with screenings for STIs, provision of condoms and hormonal contraceptives, and education) were associated with risk of attrition *before* ART initiation in adjusted analysis. However, attending a clinic providing sexual and reproductive health services including condoms was associated with significantly lower attrition *after* ART initiation for youth (aHR = 0.47, 95% CI = 0.32-0.70), as was attending a clinic offering adolescent support groups (aHR = 0.73, 95% CI = 0.52-1.0).

Two additional studies were not examined by the MacPherson systematic review, likely because they lacked an experimental design. A pediatric treatment program in Kenya which offered a multi-pronged adherence support program for children aged 0-15 utilizing behavioral, cognitive, and psychosocial strategies found high survival rates (Kaplan-Meier mortality survival estimate of 95.27% at 12 months after ART initiation) (Van Winghem et al., 2008). A peer support group for adolescents aged 10-19 at the Joint Clinic Research Centre in Kampala, Uganda, which provided counseling and a variety of other activities, reported that 16 children earlier identified as having poor ART adherence had their adherence raised to >95% (Musiime et al., 2007).

A program which supports ART adherence for young people but has not been evaluated in the peer-reviewed literature is the Teen Clubs operated by the Baylor International Pediatric AIDS Initiative. The Baylor Teen Clubs are the world’s largest network of support groups for HIV-positive adolescents and provide psychosocial support to over 3,500 HIV-positive teens in Botswana, Lesotho, Malawi, Uganda, Swaziland, and Tanzania.[[2]](#footnote-2) Teen Clubs usually meet on Saturdays and include HIV-related and life skills education, large group games, drama, art sessions, and other recreational activities. Other activities include camps, leadership training, and helping youth transition to other clinical care providers. Participants in Teen Clubs report improvements in academic performance, relationships with family and peers, and other life skills, as well as increased acceptance of their HIV status and better adherence to medications. Anecdotal evidence also suggests that Teen Club play an important role in “normalizing” the lives of young people living with HIV.

## Community-based provider-led approaches

Two studies were identified which provided community-based ART adherence support for adolescents. A large cohort study of HIV-positive children aged 0 to 15 years, operating in four provinces of South Africa, provided adherence support to 20% of the cohort through Patient Advocates who made home visits to provide adherence and psychological support (Fatti, Shaikh, Eley, & Grimwood, 2013). At an initial home visit, Patient Advocates assessed issues including tuberculosis, HIV testing of household members, nutrition security, substance abuse, domestic violence, and HIV non-disclosure. Issues which could affect adherence were then assessed by a clinic multidisciplinary team. Patient Advocates initially offered weekly home visits for a month, then monthly visits until the child was stable (virologically suppressed and regularly attending clinic), and thereafter quarterly visits. Over 4 years of follow-up, the children who received these visits were significantly more likely to achieve virological suppression (OR = 1.60, p < 0.0001).

The Hlangani HIV+ Youth Support Groups, also in South Africa, targeted youth aged 16 to 24 years in the Khayelitsha settlement of Cape Town who had been diagnosed with HIV in the previous 12 months (Snyder et al., 2014). Youth were invited to attend a 3-session cognitive behavioral support group, carried out in clinics or community spaces by non-medical professionals, which covered topics of coping and support, HIV health, and HIV prevention. The intervention had been developed collaboratively, beginning with focus group discussions with HIV-positive youth about their challenges and needs, and key informant interviews with individuals already working with HIV-positive youth. This formative research guided the development of a curriculum for a 3-session intervention, which included didactic and interactive elements such as role-plays, group reflection, and interactive discussion. The sessions also included cognitive behavioral tools, such as “feeling cups” which were filled with various levels of water to help youth visualize and modify their personal level of stress. Participants were also encouraged to set a goal at the end of each session, such as retrieving one’s CD4 count from a clinic, or disclosing one’s HIV status to a trusted acquaintance. In a pilot study of the support groups, 95% of the youth who attended these sessions were female, and mean age was 22. Participation in this intervention was shown to support ART initiation, with all of the participants in the intervention who were ART-eligible attending at least one ART clinic visit, whereas only 58% of the comparison group (youth who did not attend the sessions) did so (p < 0.001). Participants who attended all 3 sessions also reported an increase in condom usage over their involvement in the intervention, and improved attitudes towards living with HIV.

## Health behavior change communication approaches

### Reviews and meta-analyses

Five reviews and meta-analyses relevant to behavioral HIV prevention programming for youth in low- and middle-income countries were published between 2009 and 2014, all examining research from the 1990s through the late 2000s. These reviews will be summarized, before discussing findings from specific interventions.

Medley and colleagues (2009) conducted a systematic review and meta-analysis of peer education interventions (many aimed at youth) for HIV prevention in developing countries, including 30 studies. They concluded that these interventions were associated with moderate effects, specifically increased HIV knowledge (OR = 2.28, 95% CI = 1.88-2.75), reduced equipment sharing among injection drug users (OR = 0.37, 95% CI = 0.20-0.67), and increased condom use (OR = 1.92, 95% CI = 1.59-2.33). Notably, these interventions were not associated with STI infection or any other biological endpoint.

Maticka-Tyndale and Barnett (2010) examined peer-led interventions to reduce HIV risk among youth in low- and middle-income countries, including 24 interventions in their review. Consistent with the findings of Medley and colleagues (2009), Maticka-Tyndale and Barnett concluded that these interventions had generally had a positive effect on knowledge of HIV and condom use. Peer-led interventions were also found to have had some success in changing community attitudes and norms regarding HIV risk behaviors. The evidence for impact on sexual behaviors (including primary and secondary abstinence and number of sexual partner) was mixed, although the authors concluded, “peer education programs may produce delays in first sexual intercourse (primary abstinence) for some groups of youth.” The evidence for impact on self-reported STI symptoms was also equivocal, and no other biological endpoints were reported.

Michielsen and colleagues (2010) conducted a systematic review and meta-analysis of 28 HIV prevention trials (randomized and nonrandomized) for youth in sub-Saharan Africa. Many of these trials were behaviorally focused. Most interventions examined took place in schools (16 interventions), and most also contained elements of peer education (17 interventions). The authors noted that many studies had “sub-optimal” designs. Condom use was the most common outcome reported in these studies, but effects of interventions on condom use varied considerably across studies, with difference in magnitude and direction of outcomes, particularly for females. Intervention effects on condom use were larger in males than in females in all studies but one. In meta-analysis of all studies, condom use at last sex was significantly higher in intervention groups compared to control (RR = 1.46, 95% CI = 1.31-1.64) for males. This measure was not calculated for females, as heterogeneity across studies was too great. No clear picture emerged of intervention effect on sexual activity. Of the 11 studies which measured sexual activity, 3 found decreases in sexual activity or increases in abstinence, while 3 found increases in sexual activity. Data on intervention effect on multiple partnerships were also equivocal.

Mavedzenge and colleagues (2011) similarly conducted a systematic review of HIV prevention interventions for young people in sub-Saharan Africa, which expanded on an earlier systematic review conducted for UNAIDS using the *Steady, Ready, Go!* Approach (Ross, Dick, & Ferguson, 2006). Interventions were classified by setting: schools, health services, or geographically defined communities. Interventions which were offered primarily through mass media or which targeted young people most-at-risk of HIV were not considered. Eleven interventions in school settings were evaluated, and all were found to have most of the 17 “best practice” characteristics identified in expert guidance for sex and HIV programs (Kirby, Laris, & Rolleri, 2007). (See Appendix 2 for a description of these characteristics.) The most common type of school-based intervention was curriculum-based and led by adults, and Mavedzenga and colleagues concluded the evidence for such interventions was “strong”. Seven of 11 school-based studies had positive effects on at least one measure of sexual behavior, and with one exception (a study with a weak design) they had no negative impacts on sexual behaviors.

Fonner and colleagues (2014) showed that there is strong evidence of efficacy for school-based HIV prevention interventions, in a systematic review and meta-analysis of such interventions in low- and middle-income countries. School-based interventions showed impact on all five outcomes examined in the meta-analysis. Students who received school-based sex education had greater HIV knowledge, self-efficacy for refusing sex or using condoms, condom use (OR = 1.34), fewer sexual partners (OR = 0.75), and less initiation of first sex during follow-up (OR = 0.66) (p. < 0.001 for all). Although 9 of the 64 studies examined were abstinence-only (the others provided comprehensive sexuality education), there was not sufficient evidence to establish their effectiveness (Fonner et al., 2014).

### School-based behavior change interventions

The 3-site SATZ (South Africa and Tanzania) Project offered instruction through teachers to youth aged 12 to 14 years and showed impact on sexual debut among boys in Dar es Salaam (OR = 0.65). No significant effects were found on sexual debut among girls in Dar es Salaam or among students in Cape Town and Mankweng, South Africa, or on condom use in any group (Mathews et al., 2012). This intervention was curriculum-based and involved 11 to 17 hours of instruction and activities, including teacher-led presentations, skills training, discussions, role-plays and small group activities, and homework to involve parents.[[3]](#footnote-3) Lesson topics (varying somewhat by site) included self-image, values clarification, adolescent development (personal, social, and physical), sexuality and reproductive health, gender roles, intimate partner violence, and sexual decision-making.

An HIV prevention peer-education intervention was implemented in Rwandan secondary schools through the Rwandan Red Cross, but saw no effect on sexual behaviors or knowledge, although a reduction was seen in reported HIV stigma, compared to control (Michielsen et al., 2012). The goal of the intervention was to activate anti-AIDS clubs in schools in order to increase HIV knowledge, change attitudes, reduce sexual risk behaviors, and promote sexual and reproductive health. Peer educators from 15 secondary schools attended training, and were tasked with teaching fellow students how to adopt positive and responsible behaviors through group and individual counseling, drama and music, and other interactive methods.

In Kenya, the Primary School Action for Better Health (PSABH) in-school HIV education initiative was offered nationally to children aged 11-16 (Maticka-Tyndale, Wildish, & Gichuru, 2007). In a quasi-experimental study of 80 schools, it was found to delay first sex and decrease sexual activity for girls, and increase condom use for boys. This intervention was offered to upper primary-school students and was peer-supported and teacher-led, with teachers being trained through the existing Ministry of Education infrastructure in two week-long residential trainings. The curriculum was based on social learning theory and included role modeling, practice of desired behaviors and activities, and didactic instruction.[[4]](#footnote-4) Some schools also instituted school health clubs and other activities such as assemblies, drama, music and literary performances. PSABH was designed to be an ongoing part of the school curriculum, rather than a time-bound intervention.

A youth-led model developed by Restless Development[[5]](#footnote-5) was evaluated in Zambia, and positive effects were found on knowledge, attitudes,(Denison et al., 2012)viors (Denison et al., 2012). In this model, trained volunteer peer educators between the ages of 18 and 25 were placed in schools to teach students in grades 5 to 12 through the School HIV/AIDS Education Program (SHEP). The main in-school activity offered by the volunteer peer educators was a weekly 40-minute participatory classroom lesson covering topics of HIV prevention, reproductive health, and life skills. The volunteer peer educators also ran youth resource centers offering a library and counseling, offered extracurricular activities and community educational events, and built the capacity of teachers through workshops on specific topics. Students in schools where SHEP had been implemented for at least 3 years were found to have higher levels of knowledge of HIV and reproductive health, as well as more positive attitudes towards PLHIV and greater self-efficacy to refuse unwanted sex and access condoms, compared to schools where SHEP had not been implemented. Students at SHEP schools were also more likely to report no sex in previous year (OR = 1.26, 95% CI = 1.03-1.56) and to have had only one lifetime sex partner (OR = 1.43, 95% CI = 1.00-2.03), although not more likely to report virginity.

An ABC (abstain, be faithful, use condoms) intervention known as I Choose Life was evaluated at Kenyatta University in Nairobi, Kenya (A. N. Miller et al., 2008). Although the organization I Choose Life is faith-based, the intervention did not identify as such when implemented at Kenyatta University. I Choose Life had initially focused mostly on abstinence promotion with activities such as sexual purity pledge cards and t-shirts with abstinence messages. Activities focused on faithfulness and condom use were added later, including through small and large group messaging, and the stated purpose of the intervention became developing a “university-wide environment within which students can feel affirmed and even proud to make choices toward any responsible option: A, B, or C” (A. N. Miller et al., 2008, p. 347). Surveys of students systematically sampled before and after the 2-year intervention showed that no changes in abstinence or number of sexual partners, but small but statistically significant changes in condom attitudes and behavior, and a near doubling of HIV testing. Although the study design could not prove that these changes were associated with the intervention, surveyed students listed ICL as their top source for HIV information.

### Other behavior change interventions

Seven interventions reviewed by Mavedzenge and colleagues (2011) had components based in health facilities, primarily involving making health services more youth-friendly and training facility staff, and some facilities also utilized peer educators. These programs generally increased youth uptake of health services, although the authors summarized the evidence for such interventions for HIV prevention as “generally weak”. Eleven studies of community involvement and engagement were evaluated, and the authors acknowledged the difficulties in appropriately evaluating such studies. They were cautious in drawing conclusions about the effectiveness of these studies, stating that there was “some evidence” that community-based approached could have the “potential to positively affect several reproductive health outcomes in young people” (Mavedzenge, Doyle, & Ross, 2011, p. 582).

Mavedzenge and colleagues also note that the five studies designed to measure HIV and other biological outcomes generally did not demonstrate an effect on these outcomes. Of the five studies, two large RCTs, *MEMA kwa Vijana* in Tanzania and *Regai Dzive Shiri* in Zimbabwe (Cowan et al., 2010; Ross et al., 2007), failed to find any significant impact on biological endpoints (HIV, HSV-2, and pregnancy for both projects, and additionally, chlamydia and gonorrhea for MEMA kwa Vijana). MEMA kwa Vijana was a multi-component intervention which included community activities, teacher-led, peer-assisted sexuality education offered to students in late primary school, training and supervision of health workers to provide youth-friendly ASRH services, and condom social marketing (Ross et al., 2007). Regai Dzive Shiri was a similarly comprehensive intervention targeting young people, parents, and clinic staff, which aimed to change social norms, improve access to ASRH, and increase parent-child communication (Cowan et al., 2010).

A trial of the Stepping Stones[[6]](#footnote-6) intervention in South Africa (Jewkes et al., 2008) was successful in reducing HSV-2 but not HIV incidence among individuals in intervention communities compared to those in control communities (RR = 0.67, 95% CI = 0.46-0.97). This intervention was an intensive, 50-hour program which aimed to improve sexual health by using participatory learning approaches to stimulate critical reflection and build stronger, more gender equitable relationships. Women and men met in single-gender groups for 13 sessions of several hours each, held over 6 to 8 weeks. These sessions were highly participatory and included critical reflection, role play, drama, and a focus on participants’ everyday lives. The intervention also included a final community meeting. Besides reducing the risk of HSV-2, the intervention also showed some impact on intimate partner violence and transactional sex, with male participants reporting less transactional sex at 1-year follow-up and less intimate partner violence at 2-year follow-up, compared to the control arm. However, women in the intervention group were *more* likely to report transactional sex at 1-year follow-up, compared to control. Notably, participants in this program had self-selected (as did participants in the control program in the control communities) and differences may have existed between individuals included in the study in the two types of communities, in spite of those communities being randomly allocated to the intervention or control arm.

The IMAGE study, also in South Africa, showed reduced IPV but not HIV incidence, although the study lacked sufficient power to detect differences in HIV incidence between intervention and control (Pronyk, Hargreaves, Kim, & Morison, 2006). This intervention was primarily a structural intervention, and will be discussed in the next section. A fifth study with biological endpoints found that HIV prevalence was lower among South African young people who had been exposed to the national *loveLife* program, than among those who lacked this exposure, but this study lacked an experimental design (Pettifor et al., 2005).

Several other studies have examined the impact of mass media HIV prevention interventions, although none of these studies were designed with biological endpoints or experimental designs. The *100% Jeune* youth social marketing program in Cameroon used a combination of mass media and interpersonal communication methods to motivate urban youth to abstain from sex or use condoms (Plautz & Meekers, 2007). Three waves of the Cameroon Adolescent Reproductive Health Survey found increases in condom use, including consistent use with regular partners, among both young women and young men. Dose response analyses indicated that these changes could be attributed to the intervention. No changes were seen in abstinence or number of sexual partners. MTV’s Staying Alive campaign was launched in 2002, and reached over 166 countries worldwide. A 2007 evaluation of the campaign in Nepal, Brazil, and Senegal found that exposure to the campaign was consistently and positively associated with interpersonal communication about HIV and with HIV prevention beliefs, suggesting that the campaign may have positively influenced social norms (Geary et al., 2007). An evaluation of Soul City, a mass media communication campaign which operated in southern Africa through television and radio dramas and print materials, found that exposure to the campaign was associated with increased condom use, increased HIV-related knowledge, and improved attitudes towards people living with HIV in some of the 8 countries evaluated, although this was not consistent across all countries and sub-populations (Soul City Institute, 2008).

Padian and colleagues noted in 2010 that globally, a full 90% of HIV trials had failed to show effect. Among the ‘flat’ results were all 7 trials of behavioral interventions conducted to that point, although a trial in Uganda in the late 1990s had shown lower HIV incidence among a sub-group of sexually active women (IRR=0.41, 95% CI = 0.19-0.89) (Kamali et al., 2003; Quigley et al., 2004). Low power to detect differences between study arms may have been a factor in these non-significant results, particularly because HIV incidence in these trials was often lower than expected. Another issue is the fact that many control arms in fact received some form of HIV prevention intervention, which combined with lower-than-planned adherence or exposure to the intervention in the intervention arm, may have resulted in minimal differences between the two study arms (Padian et al., 2010). The authors conclude, “It is clear from results of recent trials that, in the near-term, there will be no single ‘magic bullet’ for HIV prevention. Instead, the emphasis in prevention research is shifting to evaluation of combination prevention packages in which synergies among interventions with modest levels of effect might lead to substantial efficacy overall.” (Padian et al., 2010, p. 632). Similarly, the Regai Dzive Shiri Project, in reporting the disappointing results that the four-year project had no impact on HIV, HSV-2, current pregnancy, or self-reported sexual behavior, concluded that “a consensus seems to be emerging that behavioral interventions alone are unlikely to be sufficient to reverse the HIV epidemic and that it is likely that combination approaches that integrate behavioral, biomedical, and structural components will be more effective at a population level” (Cowan et al., 2010).

### Yet-to-be-evaluated behavior change approaches

A large trial known as Promoting Sexual and Reproductive Health among Adolescents in Southern and Eastern Africa (PREPARE) is currently underway to evaluate four distinct interventions in four sites in Africa (Limpopo and Western Cape in South Africa, and one site each in Tanzania and Uganda) (Aarø et al., 2014). All interventions are school-based, and aim to change sexual behavior, including delaying sexual debut. They aim to achieve this goal through somewhat diverse mechanisms, including changing beliefs and cognitions related to sexual practice in Limpopo, improving parent-child communication on sex in Uganda, reducing IPV in Western Cape, and increasing peer-to-peer communication in Tanzania.

A great many behavior change interventions have not been evaluated in the peer-reviewed literature, although lack of rigorous evidence does not mean lack of impact. As an example, the Youth Peer Education Network (Y-PEER) is an initiative of the UNFPA, and was formed in 2001 to serve as an umbrella organization for youth-to-youth HIV prevention programs (Adamchak, 2006). Y-PEER provides training, coordination, and tools for peer education programs and has a memberships of over 700 organizations in more than 50 countries as members. Y-PEER Kyrgyzstan has over 20 organizations as members which together promote the sexual and reproductive health of young people through activities such as photo exhibitions, film and theater, activism, advocacy, and trainings.[[7]](#footnote-7) No evaluations of this program were identified.

In response to the fact that the systematic review by Mavedzenge et al. (2014) “did not yield any conclusive evidence on how effective interventions can be delivered to adolescents to yield optimal impact on HIV outcomes” (Kasedde, Kapogiannis, & McClure, 2014 p. S141), a commentary was commissioned in the same issue of *JAIDS* to address innovations in HIV prevention programming for adolescents. McClure et al. (2014) drew on key informant interviews as well as published literature to explore new horizons in prevention for youth. They concluded that the most innovative programming today focuses on “new *ideas* for creating and disseminating messages intended for adolescents, regardless of the medium of communication” (p. S225). Among these new ideas are social networking, both in-person and virtual, as well as new uses of media. An example is the multiplatform Project Ignite, a collaboration between MTV, PEPFAR, and UNICEF operating in several African countries. Project Ignite uses a television drama (“*Shuga*”), radio, social media, mobile technology, and peer-to-peer education to disseminate messages about HIV/AIDS and attempt to change social norms and attitudes. The authors state that information and communication technologies (including mobile phones, social media, and the Internet) have great potential to drive social change and new modalities of HIV prevention. These technologies are ubiquitous, even in low-resource settings, allow youth to maintain privacy and confidentiality, and could allow prevention programs to reach large numbers of young people efficiently and cost-effectively. However, such approaches as yet lack evidence of effectiveness.

## Integrated and multi-sectoral socio-economic approaches

The 2000s saw the advent of a number of socio-economic interventions for HIV prevention, particularly for young girls and women, and arguably in response to disappointments with the results of previous behavioral interventions. Gibbs and colleagues (2012), in a review of structural interventions for gender equality and livelihood security, write that “behavioral HIV prevention interventions have had weak outcomes” and that focus therefore turned to structural interventions. They define three types of such interventions: microfinance and gender empowerment, financial literacy and gender empowerment, and supporting girls’ attendance in primary and secondary school (Gibbs, Willan, Misselhorn, & Mangoma, 2012, p. 1). Nevertheless, the evidence for such interventions has also, to date, been somewhat inconclusive. Pettifor and colleagues, in a review of cash transfer programs and their impact on HIV, note that at the time of writing only one study had been successful in finding a decrease in HIV prevalence related to cash payments (Baird, Garfein, McIntosh, & Özler, 2012), although not all studies examined were designed to detect biological outcomes. Since Pettifor et al.’s 2012 review, the findings of several major cash transfer trials have been released, which have provided mixed results.

Hardee and colleagues, in a review of effectiveness of HIV prevention interventions for adolescent girls, write, “among the structural interventions to reduce the risk of HIV for adolescent girls, the most powerful is to keep girls in school” (Hardee et al., 2014a p. S177). Keeping girls in school may be achieved through abolishing school fees or providing education support for orphans and vulnerable children (including through conditional cash transfers). A pilot RCT in Kenya found that providing comprehensive school support to orphans aged 12-14 (consisting school fees, uniforms, and “community visitor” who monitored and supported school attendance) resulted in beneficiaries being less likely to drop out of school (4% vs. 12% in a control group, p < 0.05) or initiate sex (19% vs. 33%, p = 0.07) (Cho et al., 2011). Similarly, a study in Zimbabwe which followed participants for 5 years found that paying for school fees, uniforms, and a school-based helper to monitor and support school attendance, increased school attendance for girls who were 10 to 16 years at baseline, compared to girls in control schools (Hallfors et al., 2011). At 2-year follow-up, girls in control schools were more likely to have dropped out of school (OR = 8.5, p < 0.001) and have married (OR = 2.92, p = 0.02). Girls in intervention schools were more likely to believe they could complete high school, college, and more likely to report waiting to have sex (p < 0.05 for all) (Hallfors et al., 2011). At 5-year follow-up, most of these gains were maintained, but disappointingly, there was no difference between intervention and control arms in HIV or HSV-2 incidence (Hallfors et al., 2015). A large RCT in Kenya found that providing free school uniforms to 6th graders (average age 13.5 years) reduced teen pregnancies among married girls (although not out-of-wedlock teen pregnancies) at 3-year follow-up. A second component of the intervention offered training to teachers at intervention schools to help them deliver Kenya’s national HIV/AIDS curriculum, and for girls at schools in which both benefits were offered, HSV-2 incidence was reduced at 7-year follow-up compared to control (Duflo, Dupas, & Kremer, 2014).

The IMAGE study was a large RCT which combined a microfinance program with participatory training on HIV, gender norms, domestic violence, and sexuality. Beneficiaries of the intervention, who were women between the ages of 18 and 96, reported a lower incidence of past-year IPV (physical or sexual) compared to women in the control arm (aRR = 0.45, 95% CI = 0.23-0.91), and also scored higher on a number of other empowerment indicators (although mostly not significantly so) (J. C. Kim et al., 2007). The second cohort which was examined for intervention impact was young women between the ages of 14 and 35 who lived in households with intervention beneficiaries. This cohort did not report lower sexual risk (rates of unprotected sex with a non-spousal partner), compared to control (Pronyk et al., 2008). Finally, HIV incidence in the intervention communities at 3-year follow-up was compared to HIV incidence in control communities, but the study was found to be insufficiently powered, and no significant difference was found (Pronyk et al., 2006).

A pilot RCT in Zimbabwe known as the SHAZ! project had somewhat similar goals, and offered life skills and health education, vocational training, micro-grants, and social support (Dunbar et al., 2014). A control arm included life-skills and health education only. At 2-year follow-up, women in the women in intervention arm reported less transactional sex (OR = 0.64, 95% CI = 0.50-0.83), higher likelihood of using a condom with current partner (OR = 1.79, 95% CI = 1.23-2.62) compared to baseline, although there were no significant differences in these indicators between study arms.There was no difference between intervention and control on HIV, HSV-2, sexual debut, or unintended pregnancy.

An intervention with a quasi-experimental design found that offering peer support, reproductive and financial education, and a savings account to girls aged 10-23 in a low-income area of Kampala, Uganda, resulted in greater HIV-related knowledge. However, a second group which received a savings account only reported increased economic assets but also more sexual violence compared to comparison group (greater likelihood of having been sexually touched [OR = 3.146, p < 0.01] and being harassed by men [OR = 1.962, p < 0.05]), and also an increase in sexual violence compared to baseline. These findings suggest that offering economic empowerment without increasing “social and health assets” may have adverse effects (Austrian & Muthengi, 2014). A study in Republic of Congo, lacking an experimental design, found a correlation between income-generating activities and reduced likelihood of having sex with a new partner without a condom (Boungou Bazika, 2007).

Perhaps the most robust evidence to date for the success of CCTs comes from an RCT in Malawi which found that beneficiaries who were enrolled in school at baseline had a lower risk of HIV and HSV-2 at 18-month follow-up compared to control (HIV aOR = 0.36, 95% CI = 0.14-0.91 & HSV-2 aOR = 0.24, 95% CI = 0.09-0.65), and that girls receiving CCTs were 3 to 4 times more likely to stay in school compared to girls in the control group (Baird et al., 2012). The intervention also had a positive effect on girls who were out of school at baseline, who had a lower risk of pregnancy compared to control (RR = 0.70, p <.05).

Other cash transfer trials have also shown success. In Tanzania, young adults between the ages of 18 and 30 were randomized to receive monthly payments of US$10 or US$20, contingent on testing negative for four common STIs at check-ups held every 4 months. Individuals in the higher-value CCT arm, but not the lower-value CCT arm, showed reduced incidence of STIs (de Walque et al., 2012). In Kenya, unconditional cash transfers of approximately US$20 were given to the main caregiver in the household, and the sexual behavior of young people aged 15-25 in the intervention households was evaluated (Handa, Halpern, Pettifor, & Thirumurthy, 2014). Young women in the intervention group were less likely to have become sexually active compared to control (aOR = 0.58 for women, 95% CI = 0.38-0.87), although there was no significant effect among young men or on condom use, number of partners, or transactional sex in either group. In Lesotho, an intervention utilized an innovative lottery ticket scheme, in which men and women between the ages of 18 and 30 received a lottery ticket in exchange for testing negative for syphilis and *trichonomiasis vaginalis,* both treatable STIs (Björkman-Nyqvist, Corno, De Walque, & Svensson, 2015; Björkman-Nyqvist, Corno, Walque, & Svensson, 2013). If the beneficiary’s ticket was drawn, he or she would receive an amount of money equal to approximately US$50 (in one arm of the study) or US$100 (in another arm of the study). At 2-year follow-up, HIV incidence was shown to be significantly lower in both intervention arms compared to a control arm (OR = 0.75, 95% CI = 0.58-0.97). Women showed an even greater effect (OR = 0.67, 95% CI = 0.52-0.86) as did the high-value (US$100) arm (OR = 0.69, 95% CI = 0.50 – 0.98).

A program called Stepping Stones/Creating Futures, which combines behavioral and structural approaches, has recently been piloted in South Africa (Jewkes et al., 2014). This program builds on the previously evaluated Stepping Stones intervention (Jewkes et al., 2008), and additionally incorporates an economic empowerment component. Participants, all of whom were out-of-school youth between the ages of 18 and 30, were supported in finding work or setting up a business, but in contrast to a number of other economic interventions, were not given cash or loans. This program showed effects on IPV for women, with women who participated reporting experiencing less IPV compared to baseline (p = 0.037). (The study did not have a control group.) Men who participated in the program did not report perpetrating less IPV, compared to baseline. In addition, men and women reported better scores on gender attitudes and fewer controlling behaviors towards partners.

The preliminary results of two large CCT trials, both in South Africa, were announced in July 2015 at the International AIDS Society Conference, although full results have not yet been released. The CAPRISA 007 trial offered conditional cash incentives to intervention schools for participation in the program and submitting reports, reaching academic benchmarks, and meeting HIV testing targets. The intervention achieved lower HSV-2 incidence (IRR = 0.70, p = 0.007), but not lower HIV incidence among students in grades 9 and 10, compared to matched control schools (Abdool Karim, 2015). In the other trial, HPTN 068, young women aged 13 to 20 received cash transfers conditional on 80% school attendance, and their parents or guardians also received monthly cash transfers. Young women receiving the CCT reported fewer sex partners, less unprotected sex, and experiencing less IPV, but did not have lower HIV incidence, compared to control. However, school attendance was correlated with lower HIV risk (Pettifor, 2015).

Also at the cutting edge of research of socio-economic approaches is an RCT known as SUUBI+Adherence which is currently underway in Uganda to evaluate the impact of an economic empowerment intervention on ART adherence (Ilic, Ssewamala, & Sekitoleko, 2014).

## Parental and family influence and communication

A relatively unexplored approach to HIV prevention for young people is that of engaging parents and families. Multiple studies have shown that young people want their parents to communicate with them about sexuality (Bastien, Leshabari, & Klepp, 2009; Crichton, Ibisomi, & Gyimah, 2012; Namisi et al., 2009). However, such communication is often minimal or non-existent (Biddlecom, Awusabo-Asare, & Bankole, 2009; Namisi et al., 2009; Sidze & Defo, 2013). In many contexts there are cultural norms which discourage parent-child communication about sex (Izugbara, 2007; Kajula, Sheon, de Vries, Kaaya, & Aarø, 2013). When communication about sexuality does occur, parents may portray sex negatively (Izugbara, 2007), focus on bad behaviors to avoid rather than positive behavior to adopt (Kajula et al., 2013), or assume that their adolescent children know more than they do (Wamoyi et al., 2011). Parents may base their communication in fear and threats, which can discourage their children from asking questions or engaging in a bi-directional conversation (Kajula et al., 2013). In contrast, close mother-daughter relationships were found to facilitate good communication about sexuality in Kenya (Crichton et al., 2012).

Research has shown that family structure and parental communication and supervision influences youth sexual behavior. In a 4-country study (Burkina Faso, Ghana, Malawi, Uganda), unmarried youth aged 15 to 19 reported moderate to high levels of parental monitoring, but low levels of parents communication about sexual matters (Biddlecom et al., 2009). Low parental monitoring was associated with greater likelihood of having had sex in past year for all groups except Malawian females, but was not associated with contraceptive use. Communication with parents about sexuality was positively associated with sexual activity and with contraceptive use in some countries, but not in all. In Tanzania, students aged 12-14 who communicated with a teacher about sex and HIV were less likely to initiate sex, although communication with parents did not have this effect (Kawai et al., 2008). Another study of 3 sites in Tanzania and South Africa similarly found that adolescents who communicated with significant adults (parents, other adult family members, and teachers) about sexuality (including HIV/AIDS, abstinence, and use of condoms) were more likely to use condoms (Namisi et al., 2013). In Nairobi, Kenya, unmarried, sexually inexperienced adolescent boys aged 12 to 19 who reported communication with mothers were less likely to become sexually experienced over an approximately one-year follow-up, and girls aged 12 to 19 who reported parental communication with fathers were less likely to become sexually experienced over follow-up. Notably, parental monitoring and discipline did not predict sexual experience for either gender (Okigbo, Kabiru, Mumah, Mojola, & Beguy, 2015).

In Ghana, a prospective study showed that parental behavioral control was associated with decreased risk of coerced sex while parental conflict was associated with increased risk of coerced sex, although this effect was seen only in cross-sectional analysis and not in prospective analysis (Bingenheimer & Reed, 2014). Also in Ghana, youth who reported communicating with parents about HIV/AIDS were no more or less likely to report sexuality activity but were more likely to report using a condom at last sex (Adu-Mireku, 2003). In Cameroon, data from a 1996-1997 survey showed that young people living in a two-parent nuclear family were found to have the highest median age at first premarital intercourse, compared to youth living in other types of families (Dimbuene & Defo, 2011). The same survey showed that the higher the quality of parent-child relationships, the lower the likelihoods of young males having multiple sexual partners (OR = 0.63, p < 0.05) or of young females being sexually active (OR = 0.51, p < 0.10) or having multiple sexual partner (OR = 0.64, p < 0.10) (Sidze & Defo, 2013). In Côte d’Ivoire, youth who lived in the same household as their fathers during childhood, perceived their parents as disapproving of premarital pregnancy, and communicated with parents about abstinence were more likely to report primary and secondary abstinence and less likely to report having multiple sex partners (Babalola, Tambashe, & Vondrasek, 2005).

Less research regarding parent-child communication is available for non-African settings. In Thailand, a mixed-methods study of secondary school students found that parental input was limited and that girls were navigating dating relationships without parental support (Vuttanont, Greenhalgh, Griffin, & Boynton, 2006). Youth reported conflicting values: they both desired modern relationships and gender roles, including dating and premarital sex, but also valued traditional norms of modesty and virginity (in girls) and obedience to their parents. In The Bahamas, an intervention which combined a classroom-based HIV prevention intervention for grade 10 students with a parent-youth intervention which emphasized parent-youth communication demonstrated significantly increased HIV knowledge, HIV knowledge, condom-use skills and self-efficacy, and marginally increased condom use, compared to control (Stanton et al., 2015). Other arms of the study which included the classroom-based component and a parent-only component, but not the parent-youth communication component, did not show this impact. The classroom-based component focused on the story of a fictional family and included games, interactive discussions, role plays, and homework exercises. The parent-youth component used a 22-minute video illustrating parent-child conversations about sex and providing information about HIV and condoms, and was followed by a discussion between the parent and adolescent child as well as practice of correct condom usage. The parent-only component also utilized a 22-minute video, focusing on career development but not on HIV or sexual health, and was also followed by a parent-child conversation.

A number of interventions have shown positive impact in increasing parent-child communication about HIV and sex (Bhana et al., 2004; Bogart et al., 2013; Phetla et al., 2008; Vandenhoudt, Miller, & Ochura, 2010). Several programs are described in greater detail below.

The Families Matter! Program (FMP) is a CDC/PEPFAR intervention aimed at parents or caregivers of 9 to 12 year-old pre-adolescents which is designed to improve parent-child communication about sexual risk reduction and parenting skills, with the end goal of reducing sexual risk behavior among adolescents (PEPFAR/CDC, 2014). Parents or caregivers are invited to attend 5 or 6 sessions, which are participatory and led by trained facilitators (Vandenhoudt et al., 2010). At the last session, children are invited to participate in a guided communication exercise. FMP has been implemented and evaluated in 8 African countries, translated into 15 European and African languages, and implemented by over 60 non-governmental organizations, faith-based organizations, and Ministries of Health (PEPFAR/CDC, 2014).[[8]](#footnote-8) In Kenya, FMP was found at 1-year follow-up to improve parenting skills and parent-child sexuality communication (Vandenhoudt et al., 2010).

The Let’s Talk! intervention is also aimed at encouraging parents to engage in communication with their children about HIV and sexual health, and has been adapted from the US-based program Talking Parents, Healthy Teens for use in South Africa (Bogart et al., 2013). This intervention consists of five 2-hour group sessions for parents of adolescents aged 11 to 15, with approximately 15 parents per session. Sessions are led by trained facilitators and cover topics of HIV/AIDS, sexual violence, communication skills. Program material is primarily communicated verbally and the sessions included role play and discussion. Parents are given take-home activities to do with their adolescent children. In Cape Town, South Africa, the Let’s Talk! intervention was offered in a workplace, with parents randomized to receive the intervention or wait-listed to receive it at a later time (Bogart et al., 2013). Compared to the control arm, parents in the intervention arm reported being significantly more comfortable talking to their adolescent children about sex after the intervention and were more likely to have reported discussing sex and HIV-related topics with their children.

Collaborative HIV/AIDS and Adolescent Mental Health Programme (CHAMP) is a community-collaborative developmentally-timed intervention which originally focused on preventing HIV infection in pre-adolescents (aged 9-13) through promoting resiliency in pre-adolescent youth and their families before youth become sexually active (Bhana et al., 2004; Bhana, McKay, Mellins, Petersen, & Bell, 2010). CHAMP seeks to empower youth to resist negative peer influences, and to strengthen “key family processes” so that youth can be supported in avoiding risk-taking behaviors (Bhana et al., 2004). CHAMP also focuses on community-level processes and developing community competencies to protect community members from negative risk influences. It was first developed for low-income minority populations in the United States but has been adapted and used in other contexts including South America, the Caribbean, and sub-Saharan Africa (Bhana et al., 2010). Research has shown that CHAMP has been successful in increasing parents’ comfort level in discussing sensitive topics with children and in decreasing sexual risk for youth (Bhana et al., 2004).

In South Africa, CHAMP was culturally adapted through a community collaborative process and introduced in 2001 as the *Amaqhawe* program (Bhana et al., 2004)*.* The adaptation process involved an ethnographic study which found that parents were disengaged, that communication between parents and children was poor, that parenting was often undertaken in a punitive manner, that knowledge of HIV/AIDS was low, and that losing family members to HIV was common, resulting in unresolved grief. The family and community “protective shields” were weak, leading to low levels of social control for youth. CHAMP thus sought to address risk at individual (youth), family, and community levels, by strengthening the resilience of pre-adolescents to resist negative peer influence, strengthening parent-child communication (especially about sex and HIV) and parental supervision and monitoring, and creating a more cohesive and health-enabling community through measures such as improving access to health services.

Through the *Amaqhawe* program, families were offered small group participatory learning over 10 weeks in a pilot study (Bhana et al., 2004). A cartoon-based storyline was used to introduce sensitive topics and engage participants in participatory activities, such as acting out how a character should communicate with a child in a certain situation.[[9]](#footnote-9) Participants were also given assignments to complete at home using a workbook. Compared to control, families who received the intervention showed significant improvement pre-intervention to post-intervention in knowledge of HIV/AIDS, parental communication styles (from passive aggressive and manipulative communication to more assertive styles), and communication about sensitive topics such as alcohol, drugs, HIV/AIDS, bad friends, puberty, and sex. The intervention group also showed greater social network support post-intervention compared to control.

CHAMP has also been adapted to serve the needs of young people living with HIV and their caregivers in the United States and South Africa, in a program called CHAMP+ (Bhana et al., 2010). CHAMP+ was developed through a collaborative process which involved key stakeholders in adapting the program to be culturally and contextually relevant. CHAMP+ has many of the same goals as CHAMP (such as strengthening parental supervision and monitoring and family communication about sexuality and HIV) and also focuses on the impact of HIV on the family, loss and stigma associated with HIV, ART adherence and helping youth manage their health and medication, and social support and decision-making related to disclosure. CHAMP+, like CHAMP, is a family-focused intervention which uses a manual, cartoon narratives, and small group participatory learning. In South Africa, families who received the intervention were found to have better knowledge of HIV transmission, less stigma towards people living with HIV, increased communication about HIV, increased monitoring of their children, and better social support, compared to controls (Bhana et al., 2010). A pilot of the CHAMP+ approach, called the VUKA program, is described in this review and in Bhana et al. 2014.

# Recommendations

The findings from this review demonstrate that while the search for highly effective HIV prevention approaches for adolescents and young adults continues, to date there is no silver-bullet, iron-clad prevention intervention (or even package of interventions) which has been unequivocally proven to reduce HIV risk for all groups of young people in all contexts. Rather, the evidence to date suggests that while a variety of HIV prevention approaches have shown effect on various outcomes, the effectiveness of interventions is often partial, inconsistent between studies, and highly context-specific. Clear shifts have been seen in the types of prevention interventions which have received investment and research over the last two decades, doubtless reflecting donor fatigue and discouragement that the effectiveness of previous HIV prevention strategies has not been more unequivocal. The latest wave of prevention trials has focused on structural interventions and cash transfers, and while these trials have shown some compelling and promising outcomes, the trials have been far from wholly successful. In particular, reducing HIV incidence itself remains an elusive and often unachieved goal, even for the latest and most promising prevention interventions.

Treatment-based HIV prevention interventions, including treatment as prevention and pre-exposure prophylaxis, are increasingly being seen as feasible and even morally imperative. While these interventions have not been specifically tested among adolescents, available evidence suggests that the barriers to successful ART adherence among adolescents are significant, and that much remains to be done in understanding these barriers and supporting adolescents in successfully adhering to treatment regimes. The field is ripe for new models of how to support adolescents (and their families) in accessing and being retained in HIV treatment, including overcoming barriers of stigma and disclosure.

Keeping youth, especially girls, in school may be one of the most powerful tools we have, and also deserves continued investment. Gender inequities, including gender-based violence, continue to underpin HIV risk for girls and young women, yet tragically, very few successful models exist for confronting and changing these dangerous realities. Investing in structural approaches such as economic empowerment and cash transfers has shown some promise for changing gender attitudes and reducing IPV.

Engaging parents and families may also be a highly effective, if relatively untested, strategy. Numerous studies show that young people want their parents to communicate with them about sexuality, but that such communication is often absent or insufficient. Substantial research has also shown that such communication, as well as parental monitoring and supervision of young people, has significant impacts on youth sexual behavior, including the transition to sexual activity. Considering that young people are receptive to parental communication about sexuality and that this communication has such clear impact, training and supporting parents to talk with their children about HIV and sex would seem to be a clear opportunity which should not be missed.

The reality that no prevention intervention has proven itself wholly successful perhaps should cause a re-examination of older interventions, which while not on the cutting edge of prevention science, have nevertheless proven their worth over time. Specifically, school-based HIV prevention education, using theoretically sound curricula and delivered by trained adult facilitators, has shown results in multiple contexts. Another intervention which may deserve renewed investment is community-based behavior change interventions. The fact that youth sexual behaviors (including abstinence, partner reduction, and condom use) have changed for the better in a number of countries over the past 10 to 15 years suggests that changing youth sexual behavior is not a hopeless cause, although much remains to be learned about how to leverage such change.

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# Appendix 1: Table of Sources

*Notes:* **Bold type indicates significant results.** Red type indicates adverse results.Gray cells indicate qualitative research. The term “Africa” is used (for brevity) to refer to sub-Saharan Africa.

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| **Citation** | **Design & population** | **Outcome of interest** | **Country or region** | **Findings** | **Notes** |
| **Meta-analyses & reviews [19]** |
| Adejumo et al. 2015 | Review | ART adherence | Africa | Suboptimal adherence to ART may play a significant role in high AIDS mortality among youth in Africa. |  |
| MacPherson et al. 2015 | Systematic review | Linkage, retention & adherence to ART & care | Global | Reviewed 11 studies related to adolescent linkage, retention & adherence to ART & care for adolescents. Most studies were from the US and only two of which were in developing world settings (see Bhana et al. 2014 & Lamb et al. 2014). Most studies were of low to moderate methodological quality, and there was “limited evidence on the effectiveness of service delivery interventions to support adolescents’ linkage from HIV diagnosis to ART initiation, retention on ART, and adherence to ART”.  |  |
| Fonner et al. 2014 | Systematic review & meta-analysis | HIV-related knowledge and risk behaviors | LMIC | Reviewed 64 studies / 63 articles of school-based sex education for HIV prevention in LMIC; 9 were abstinence-only and 55 provided comprehensive sexuality education. HIV knowledge, self-efficacy, sexual debut, condom use, and number of sexual partners were meta-analyzed across 33 studies. **Students who received school-based sex education had greater HIV knowledge, self-efficacy for refusing sex or using condoms, condom use (OR = 1.34), fewer sexual partners (OR = 0.75), and less initiation of first sex during follow-up (OR = 0.66) (p. < 0.001 for all).** |  |

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| Hardee, Gay, & Croce-Galis, 2014 | Review | HIV epidemiology among adolescent girls | Global | Interventions needed for adolescent girls across 3 critical areas: enabling environment (inc. keeping girls in school, reducing GBV); information & services (inc. comprehen-sive sex education, harm reduction for IDU); social support (inc. caring relationships w/ adults, support for OVC).  |  |
| Hardee, Gay, Croce-Galis, & Peltz, 2014 | Review | Social and structural drivers of HIV for women | Global | Examines evidence (64 studies of 19 interventions) related to 6 factors of an “enabling environment” to address “key social and structural drivers of HIV for women”: 1) transforming gender norms, 2) addressing GBV, 3) transforming legal norms, 4) promoting women’s employment, income & livelihood opportunities, 5) advancing education for girls, 6) reducing stigma and discrimination. The evidence for interventions related to each of these drivers is rated as “successful” or “promising”. |  |
| Idele et al. 2014 | Review | HIV epidemiology among adolescents | Global | 2.1 million adolescents (10-19 yrs) living with HIV in 2012; 82% of these in sub-Saharan Africa; 58% female. Adolescents lagging in treatment and adherence, and have higher AIDS mortality compared to other age groups. |  |
| Lowenthal et al. 2014 | Review | Perinatal HIV infection among adolescents | Africa | In sub-Saharan Africa, perinatally infected children are reaching adolescence in large numbers. They have distinctive medical and psychosocial issues, including chronic clinical complications that cause severe morbidity and challenges in maintaining ART adherence and negotiating sexual relationships while navigating the changes that come with adolescent development. Clinical HIV care for this group should include integrated age-appropriate ASRH, psychological, educational, and social services. |  |

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| Mavedzenge et al. 2014 | Systematic review | HIV risk, HIV transmission, and HIV-related morbidity and mortality | Global | “Systematic review of systematic reviews” which examined data on effectiveness of 20 intervention types which address adolescent vulnerability to HIV infection, HIV risk, and HIV-related morbidity and mortality. Evidence for in-school interventions and some community-based interventions was concluded to be “high quality”. A number of interventions designed for adults (VMMC, PMTCT, HCT, ART, condom use, and provision of sterile equipment to those who inject drugs) were also concluded to have evidence of efficacy, but there is a lack of evidence about implementation of these interventions among adults. Oral PrEP and behavior change interventions showed evidence of potential efficacy. | Criticized by Hardee et al. (2014) for not disaggregating results by gender. |
| Njeuhmeli et al. 2014 | Review | VMMC | East & southern Africa | Analysed international guidance, policy documents, and global technical reviews related to VMMC for adolescents, as well as epidemiological, demographic, and sexual behavior data from 10 VMMC priority countries in E & S Africa. The proportion of adolescents in the uncircumcised male population was 34-55% in these 10 countries, and in all but 2 countries adolescent males were disproport-ionately represented among actual VMMCs done. |  |
| Cui et al. 2013 | Systematic review | HIV/STI incidence, sexual risk behaviors | Global  | Reviewed 5 interventions (7 studies) which aimed to develop small business capacity among individuals (microenterprise development) to alleviate poverty and prevent HIV. All interventions targeted women, 3 focused on sex workers, and none measured biological outcomes. Among non-sex workers, none found a difference in number of sexual partners, and only one found a significant increase in condom use or decrease in IPV (IMAGE study). |  |
| Small et al. 2013 | Review | HIV-related outcomes | Africa | Reviewed 11 articles describing 8 gender-based HIV prevention interventions in Africa. Most interventions showed positive effects on a variety of outcomes: which measured biological and behavioral outcomes, HIV risk, violence, and risk reduction. Two of these interventions targeted youth (the Stepping Stones trial, and SHAZ!).  |  |
| Gibbs et al. 2012 | Systematic review | Gender equity | East & southern Africa | Reviewed 9 interventions which sough to strengthen people’s livelihoods and transform gender relationships in east and southern Africa, which were grouped into three groups: microfinance and gender empowerment interventions; supporting greater participation of women and girls in primary and secondary education; and gender empowerment and financial literacy interventions. Three conclusions were drawn: 1) interventions have a narrow conceptualisation of livelihoods, 2) there is limited involvement of men and boys in such interventions, 3) studies have typically been done in stable populations. |  |
| Pettifor et al. 2012 | Review | HIV & HIV-related outcomes | Global | Reviewed 16 interventions (10 completed) which implemented cash transfer programs and measured HIV or HIV-related outcomes; most were targeted at adolescents in developing countries. Most saw changes in sexual behavior but only one saw a reduction in HIV prevalence linked to cash transfers (see Zomba Cash Transfer Program). |  |
| Bastien et al. 2011 | Systematic review | Parent-child sexuality communication, sexual behavior | Africa | Reviewed 23 studies on parent-child communication about sexuality in Africa, finding that such communication tends to be “authoritarian and uni-directional, characterized by vague warnings rather than direct, open discussion”, and often constrained by social and cultural norms. Increases in frequency and comfort of parent-child discussions about sexuality may be associated with positive outcomes in adolescent sexual behavior, although these associations are not yet clear based on available research. |  |

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| Mavedzenge et al. 2011 | Systematic review | Sexual behavior, biological outcomes | Africa | Reviewed 23 studies (1990-2008) of HIV prevention interventions for young people in sub-Saharan Africa. School-based interventions were classified according to whether they were curriculum-based or not, and whether they were adult or peer-led; adult-led, curriculum-based interventions were found to be effective in reducing reported risky sexual behavior. Health facility-based interventions were classified according to whether they trained service providers only, or also made health facilities more youth-friendly; interventions which did both were found to be effective. |  |
| Maticka-Tyndale & Barnett 2010 | Review | Sexual behavior, STI risk | Low- and middle-income countries | Reviewed 24 peer-led interventions (1994-2008) which aimed to reduce HIV risk of youth in low- and middle-income countries, finding that these programs have generally positively impacted knowledge of HIV and condom use, and have had some success in changing communities’ attitudes and norms. Effects on sexual behaviors (including primary and secondary abstinence and number of sexual partner) and self-reported STI symptoms were mixed, although the authors concluded, “peer education programs may produce delays in first sexual intercourse (primary abstinence) for some groups of youth.” |  |

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| Michielsen et al. 2010 | Systematic review & meta-analysis | Sexual behavior, HSV-2 & HIV incidence | Africa | In meta-analysis of 31 studies/28 interventions (1990-2010), **HIV prevention interventions for youth aged 10-25 in sub-Saharan Africa were associated with only one positive effect on sexual behavior: increased condom use among males (ever use or consistent condom use RR = 1.32, use at last sex RR = 1.46)**. Sex education and condom promotion did not increase sexual behavior or risky sexual behavior. Of 11 trials examined, only 2 contained biological outcomes, and 1 showed impact on HSV-2 but not HIV or pregnancy incidence (see Jewkes et al. 2008). |  |
| Padian et al. 2010 | Systematic review | HIV incidence  | Global | Reviewed 37 HIV prevention RCTs on 39 interventions; only 5 demonstrated positive effects on HIV incidence. All were trials of biomedical interventions: male circumcision (3), STI treatment and care (1) , and HIV vaccine (1). Six trials of behavioral interventions in developing countries did not show effect on HIV. The authors conclude, “Almost 90% of RCTs had ‘flat’ results, which may be attributable to design and/or implementation.” |  |
| Medley et al. 2009 | Systematic review & meta-analysis | HIV knowledge and prevention behaviors, STI infection  | Developing countries | In meta-analysis of 30 studies (1990-2006, 8 targeting youth), **peer education interventions for HIV prevention in developing countries were associated with moderate effects: increased HIV knowledge (OR = 2.28, 95% CI = 1.88-2.75), reduced equipment sharing among injection drug users (OR = 0.37, 95% CI = 0.20-0.67), & increased condom use (OR = 1.92, 95% CI = 1.59-2.33).** Peer education programs were not significantly associated with STI infection or any other biological endpoint. |  |
| **Commentary [2]** |
| Chandra-Mouli et al. 2015 | Commentary | ASRH | Global | Youth centers, peer education, one-off public meetings have been ineffective in increasing ASRH access, changing behaviors, or influencing social norms. Comprehensive sexuality education and youth-friendly services may be effective but are often not well-implemented. |  |
| Kasedde et al. 2014 | Commentary | HIV epidemiology among adolescents | Global | HIV incidence and HIV-related deaths high among adolescents, and there is a lack of investment and adequate data for the adolescent HIV epidemic. Data are often not disaggregated for 10-19 year old cohort. |  |
| **Health systems & facility-based approaches [4]** |
| Bhana et al. 2014 | Pilot RCT, 65 children aged 10-13 & their families | HIV adherence, other psychosocial indicators | South Africa | VUKA study: Pilot RCT carried out at two hospitals, offering 6-session intervention of ~3 months’ duration for pre-adolescents (aged 10-13) and their families. **Participants improved in all dimensions measured, including ART adherence,** mental health, youth behavior, HIV treatment knowledge, stigma, and communication, and changes in ART adherence were significant compared to control. | VUKA is an adaptation of the CHAMP program (see Bhana et al. 2004 & 2010). |
| Lamb et al. 2014 | Observational cohort study, ~312,000 individuals aged 10+ | Retention in ART | Kenya, Mozambique, Tanzania, & Rwanda | Patient records from 160 clinics were reviewed for data on loss to follow-up or death 1 year after ART initiation. Attrition before and after HIV initiation was significantly higher among youth aged 15-24 compared with other age cohorts (aHR = 1.50, 95% CI = 1.45-1.54 & aHR = 1.59, 95% CI = 1.52-1.67, respectively, compared to adults aged 25-54). Attrition was also higher for young men compared to young women. **Youth attending clinics providing ASRH services and adolescent support groups experienced significantly lower attrition *after* ART initiation compared to youth at other clinics (aHR = 0.47, 95% CI = 0.32-0.70 & aHR = 0.73, 95% CI = 0.52-1.0, respectively).** |  |
| Van Winghem et al. 2008 | Prospective cohort study, 648 children 0-14 years | HIV adherence | Kenya | Pediatric treatment program offered a 3-pronged approach (system adaptation, psychosocial support, capacity building) including child-friendly clinic environments; a family strategy including treatment for all family members in the same facility; support groups, therapy, and adherence training; and transportation and nutrition support. **Kaplan-Meier mortality survival estimate was 95.27% at 12 months after ART initiation.** |  |

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| Musiime et al. 2007 | Cross-sectional, 130 children 10-19 years | HIV adherence | Uganda | Adolescent peer support group of children 10-19 years set up at Joint Clinic Research Centre, Kampala, meeting monthly on Saturdays, and providing counseling and a variety of activities. **16 children earlier identified as having poor adherence to ART had adherence raised to >95%.** |  |
| **Community-based provider-led approaches [2]** |
| Fatti et al. 2014 | Multi-centre cohort study, 4853 children 0-15 years | HIV adherence | South Africa (4 provinces) | Community-based adherence support (provided by Patient Advocates who made home visits to provide adherence and psychosocial support) was provided to 20% of children enrolled in study, and **children receiving adherence support were more likely to achieve virological suppression (OR = 1.60, p < 0.0001)** over 4 year follow-up.  |  |
| Snyder et al. 2014 | Observational study, 109 HIV+ youth aged 16-24 | Sexual behavior, linkage to care | South Africa | Hlanganani Program: Youth aged 16-24 diagnosed with HIV in previous 12 months were invited to attend 3-session cognitive behavioral support group facilitated by laypersons, carried out in clinics or community spaces, and covering topics of coping & support, HIV health, and HIV prevention. Median age was 22; 95% were female. **Reported condom use at last sex increased among youth attending all 3 sessions from baseline (n = 65, p = 0.049), and 100% of all ART-eligible participants attended at least one ART clinic visit, compared to 58% in comparison group who did not attend any sessions (p < 0.001). Attitudes towards living with HIV improved.**  |  |
| **Health behavior change communication approaches [13]** |
| Aarø et al. 2014 | Multi-site prospective evaluation | Sexual behavior | Africa (South Africa, Tanzania, Uganda) | PREPARE *[trial in progress]*: 4-site study with following goals: 1) changing beliefs and cognitions related to sexual practices (Limpopo, South Africa); 2) improved parent-child communication on sex (Uganda); 3) reduced IPV (Western Cape, South Africa); 4) increased peer-to-peer communication (Tanzania). All interventions are school-based and aim to reduce HIV through changing sexual behaviors, including delayed sexual debut. |  |
| Jewkes et al. 2014 | Prospective cohort study, 232 out-of-school youth aged 18-30 | IPV and gender attitudes | South Africa | Stepping Stones/Creating Futures: Stepping Stones (see Jewkes et al. 2008) was combined with Creating Futures, an economic empowerment intervention which supported participants in finding work or setting up a business, but did not give cash or loans. When piloted among 232 out-of-school youth (no control group), women’s and men’s earnings increased and **women reported experiencing less IPV in prior 3 months compared to baseline (p = 0.037). Both men and women reported better scores on gender attitudes and fewer controlling behaviors toward partners.** No change in perpetrating IPV was seen for men. | Behavioral & structural approach; see also Jewkes et al. 2008 |
| Denison et al. 2012 | Quasi-experimental, 2133 youth in grades 8 & 9 (aged 11-19+) | HIV & reproductive health knowledge, attitudes, and behaviors |  | Restless Development/SHEP program: Trained Volunteer Peer Educators (aged 18-25) were placed in schools to teach HIV prevention and reproductive health through the School HIV/AIDS Education Program (SHEP); these volunteers also ran youth centers and extracurricular and community-based activities. 13 intervention schools (where SHEP had been operating for 3+ years) were matched with 13 control schools with total 2133 students randomly selected from grades 8 & 9 to be interviewed. Students in intervention schools had higher levels of HIV knowledge (OR = 1.61, 95% CI = 1.18-2.19), reproductive health knowledge (OR = 1.71, 95% CI = 1.21-2.49), more positive attitudes towards PLHIV and greater self-efficacy to refuse unwanted sex and access condoms. Intervention students were more likely to report no sex in previous year (OR = 1.26, 95% CI = 1.03-1.56) and to have had only one lifetime sex partner (OR = 1.43, 95% CI = 1.00-2.03) although not more likely to report virginity. |  |

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| Mathews et al. 2012 | Cluster RCT, 12,129 youth aged 12-14 | Delayed sexual debut & condom use | Africa (Tanzania, 2 sites in South Africa) | Schools were randomized to intervention or control group. Intervention consisted of 11-17 hours of classroom sessions documented in a teacher’s manual, offered to youth aged 12-14. In Dar es Salaam, **students in the intervention schools were less likely to have had their sexual debut (OR = 0.65),** although for girls the difference was insignificant**.** There were no differences in reported condom use. In Cape Town and Mankweng, South Africa, the intervention had no effect.  | See also Namisi et al. 2009 & 2013 for additional results from same trial. |
| Michielsen et al. 2012 | Non-randomized controlled trial, 1950 students mean age 18 | Sexual behavior, stigma | Rwanda | Peer education intervention was implemented in eight intervention schools (which were compared to 6 control schools). Knowledge, attitudes, and behaviors were assessed at 12- and 18-month follow-up. No effects were seen on sexual behaviors (being sexually active, condom use at last sex) or knowledge. A reduction was seen on reported stigma, in intervention compared to control.  |  |
| Cowan et al. 2010 | Cluster RCT, 4684 youth aged 18-22 | HIV & HSV-2 prevalence, current pregnancy, sexual behaviors | Zimbabwe | Regai Dzive Shiri Project: This intervention was delivered to young people, parents, and clinic staff, largely through trained peer educators, and aimed to achieve change in societal norms within communities, to reduce HIV/STIs and risky sexual behavior, and improve access to ASRH and communication between parents and children. At 4-year follow-up, intervention had had no effect on sexual behavior, HIV or HSV-2 prevalence, or current pregnancy, although there were improvements in knowledge & attitudes, and a decrease in reported pregnancies in intervention group. |  |

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| Jewkes et al. 2008 | Cluster RCT, 2776 young people aged 15-26 | HIV & HSV-2 incidence, sexual behavior | South Africa | Stepping Stones: Clusters were randomized to receive Stepping Stones (50-hour program which aims to improve sexual health by using participatory learning approaches to stimulate critical reflection), or 3-hour intervention on HIV & safer sex, and 20 men & 20 women were selected for participation in each cluster**. At 2-year follow-up, there was a reduction in HSV-2 incidence in intervention compared to control (RR = 0.67, 95% CI = 0.46-0.97). Men reported less perpetration of IPV at 2-year follow-up and less transactional sex at 1-year follow-up** (but not at 2-year follow-up). Women in intervention were >2x as likely to report transactional sex at 1-year follow-up compared to control (p = 0.016). The intervention had no effect on HIV incidence. | See also Jewkes et al. 2014 |
| Miller et al. 2008 | Pre-test / post-test, 746 university students (aged not reported) | Sexual behavior, HCT | Kenya (Nairobi) | I Choose Life (ICL) is a faith-based organization promoting ABC on university campuses (early work promoted abstinence, lactivities focusing on sexual responsibility, faithfulness, and condom use added later), while not identifying itself as religious in this work. ICL intervention at Kenyatta University was evaluated with surveys of randomly selected students before and after 2 year intervention. No changes in abstinence or number of sexual partners were seen. **Small but statistically significant changes were found in condom attitudes and behavior, and a near doubling of HIV testing.** These changes could not be linked specifically to the intervention, although students listed ICL as their top source for HIV information. |  |

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| Soul City Institute, 2008 | Cross-sectional, >71,000 youth aged 8-17 & > 18,000 adults aged 16-60 | Sexual behavior, HIV knowledge, HIV-related attitudes | Botswana, Lesotho, Malawi, Mozambique, Namibia, Swaziland, Zambia, Zimbabwe | Soul City used prime time television and radio dramas, along with print materials, advocacy, and social mobilization, in an attempt to shift social norms and decrease HIV transmission in 8 countries of southern Africa. National baseline quantitative surveys was carried out in all 8 countries in 2002, with qualitative data collected in 2004 and a national quantitative survey in all 8 countries in 2007. The evaluation found that in all 8 countries >60% of youth had been exposed to Soul City. There was evidence that exposure was associated with increased condom use, increased HIV-related knowledge, and improved attitudes towards people living with HIV in some sites, although this was not consistent in all sites/populations. |  |
| Maticka-Tyndale et al. 2007 | Quasi-experimental, mixed-method~3700 children aged 11-16 | Sexual behavior | Kenya | HIV education initiative offered to upper primary-school children in 40 interventions schools, which were compared at 18-month follow-up to 40 matched control schools. Students in intervention schools reported **delayed first sex and decreased sexual activity for girls, and increased condom use for boys.** |  |
| Geary et al. 2007 | Prospective panel study, 3,000 youth aged 16-25 (1,000 per site) |  | Nepal (Kathmandu), Brazil (São Paulo), & Senegal (Dakar) | MTV’s Staying Alive campaign: Data were collected from 1,000 youth per site (systematically sampled), before and after implementation of the campaign, through face-to-face interviews. Exposure to the campaign was consistently and positively linked to communication with sexual partners or other acquaintances about HIV, and to HIV prevention beliefs such as believing it is important to use condoms, discuss HIV with sexual partners, or get tested. |  |

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| Plautz & Meekers 2007 | Prospective panel study, >3,000 unmarried youth aged 15-24 | Sexual behavior | Cameroon (Yaoundé & Douala) | *100% Jeune* youth social marketing program used a combination of mass media and interpersonal communication methods to motivate urban youth to abstain or use condoms. The Cameroon Adolescent Reproductive Health Survey analyzed the impact of this intervention in 3 waves, each 18 months apart (2000 to 2003), among unmarried youth aged 15 to 24 (n = 1956, 3237, and 3370 for 3 waves). Increases were seen in condom use, including consistent use with regular partners, among both young women and young men. Dose response analyses indicated that these changes could be attributed to the intervention. No changes were seen in abstinence or number of sexual partners. |  |
| Ross et al. 2007 | Cluster RCT, 9645 youth aged 14-18+  | HIV and HSV-2 incidence, sexual behavior | Tanzania | MEMA kwa Vijana: Twenty communities were randomly allocated to control group (receiving standard activities) or to an intervention consisting of: 1) community activities; 2) teacher-led, peer-assisted sexuality education in late primary school; 3) training and supervision of health workers to provide youth-friendly ASRH services; 4) peer condom social marketing. **At 3-year follow-up, positive effects were seen on knowledge and boys (but not girls) were less likely to report sexual debut (aRR = 0.84, 95% CI = 0.71-1.01) and more than one partner in past year (aRR = 0.69, 95% CI = 0.49-0.95)**. There was no difference in HIV and HSV-2 incidence between intervention and control.  |  |

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| **Integrated and multi-sectoral socio-economic approaches [18]** |
| Abdool Karim, 2015 | Cluster RCT, 3217 youth in Grades 9-10 | HIV & HSV-2 prevalence | South Africa | CAPRISA 007: Conditional cash incentives offered at 7 intervention schools (paired with 7 control schools). All schools participated inlife skills & HIV education program. Participation in this program, academic benchmarks, HIV testing, and submission of report were incentivized at intervention schools. **HSV-2 incidence was lower in intervention compared to control (IRR = 0.70, p = 0.007).** There was no statistically significant difference in HIV incidence between groups, attributable to low power in study. | As of Oct 2015, results not yet published in peer-reviewed journal (these findings taken from IAS conference presentation). |
| Hallfors et al. 2015 | Cluster RCT, 328 orphan girls aged 10-16 at baseline | HIV & HSV-2 prevalence | Zimbabwe | 25 primary schools were randomized to intervention or control, and all orphan girls in grade 6 were invited to participate in program. Intervention schools received fees, uniforms, and a school-based helper to monitor and support attendance, and all schools received universal daily feeding program. The control group received delayed partial treatment of school fees 4 years after study initiation. **At 5-year follow-up, most of the gains seen at 2-year follow-up were maintained** (see Hallfors et al. 2011), but there were no difference between intervention and control on HIV or HSV-2. | See also Hallfors et al. 2011 |
| Pettifor, 2015 | RCT, ~2500 young women in Grades 8-11, aged 13-20 | HIV incidence | South Africa | HPTN 068: Monthly cash transfer to young woman and parent/guardian conditional on 80% school attendance. **Young women receiving the CCT reported fewer sex partners, less unprotected sex, and experiencing less IPV, and school attendance was correlated with reduced HIV risk.** The CCT did not reduce HIV incidence. | As of Oct 2015, results not yet published in peer-reviewed journal (these findings taken from IAS conference presentation). |

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| Austrian & Muthengi, 2014 | Quasi-experimental,1064 girls aged 10-23 | Sexual harassment | Uganda | Participants were girls aged 10-23 living in low-income areas of Kampala who chose to participate in program and were non-randomly assigned to one of two groups; comparison group was selected from nearby area. Group 1 was offered “safe spaces” group meetings with reproductive health and financial education, plus savings account. Group 2 was offered a savings account only. Group 1 had greater HIV-related knowledge but were not more likely to test than girls in the comparison group. Group 2 increased economic assets but also were more likely to have been sexually touched (OR = 3.146, p < 0.01) and harassed by men (OR = 1.962, p < 0.05) compared to comparison group, and also compared to baseline. These effects were not seen in Group 1. |  |
| Dunbar et al. 2014 | Pilot RCT 315 young women aged 16-19 (single or double orphaned) | HIV  | Zimbabwe | SHAZ! Project: Intervention included life skills and health education, vocational training, micro-grants, and social support; control included life-skills and health education only. **Over 2-year follow-up, women in intervention arm reported less transactional sex (OR = 0.64, 95% CI = 0.50-0.83), higher likelihood of using a condom with current partner (OR = 1.79, 95% CI = 1.23-2.62) compared to baseline**, although there were no significant differences between study arms.There was no difference between intervention and control on HIV, HSV-2, sexual debut, or unintended pregnancy. |  |

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| Handa et al. 2014 | Cluster RCT, 1433 individuals aged 15-25 in 1831 households | Sexual behavior | Kenya | Households in the intervention arm were given an unconditional transfer of $20/month (given to the main caregiver in the household). At 4-year follow-up**, women aged 15-25 in the intervention households were less likely to have started sexual activity (aOR = 0.58 for women, 95% CI = 0.38-0.87**; 0.74 for men, 95% CI = 0.53-1.04).There were no statistically significant differences in condom use, number of partners, or transactional sex.  |  |
| Ilic et al. 2014 | Cluster RCT | ART adherence | Uganda | SUUBI+Adherence *[trial in progress]*: In this 5-year cluster RCT, one group will receive an economic empowerment intervention with proven success as well as a package of bolstered standard of care, and the other group will receive bolstered standard of care only. ART adherence will be measured in real time.  |  |
| Björkman-Nyqvist et al. 2013 | RCT, 3426 young adults aged 18-30 | HIV incidence | Lesotho | Three-arm study in which participants who tested negative for syphilis & *trichonomiasis vaginalis* (both treatable STIs) were issued lottery tickets with high value (~US$100, Arm 1) or low value (~US$50, Arm 2); Arm 3 was control arm. All arms received STI testing, counseling, and STI treatment. At 2-year follow-up, **HIV incidence was significantly lower in both interventions arms (OR = 0.75, 95% CI = 0.58-0.97), esp. for women (OR = 0.67, 95% CI = 0.52-0.86) and in the high-value arm (OR = 0.69, 95% CI = 0.50 – 0.98).** | As of Oct 2015, results not yet published in peer-reviewed journal (these findings taken from conference abstract). |
| Duflo et al. 2012 | Cluster RCT, <9,000 girls, average age 13.5 years at baseline & 20.5 years at follow-up | Sexual behavior, pregnancy, HIV & HSV-2 | Kenya | A large randomized evaluation (involving all female 6th graders in 328 primary schools) compared two programs, implemented stand-alone or together: 1) *Education Subsidy* (providing free school uniforms) & 2) *HIV Education* (providing training to teachers to help them deliver Kenya’s national HIV/AIDS curriculum, which emphasizes abstinence until marriage). ***Education Subsidy* reduced teen pregnancies (in and not out of wedlock) and *HIV Education* reduced out-of-wedlock pregnancies at 3-year follow-up. When implemented together, HSV-2 was reduced at 7-year follow-up.** No effect seen on HIV. |  |
| Baird et al. 2012 | Cluster RCT, 1289 never-married girls & women aged 13-22 | HIV & HSV-2 prevalence | Malawi | Zomba Cash Transfer Program: Participants were randomized to a conditional cash transfer programme or no programme. The intervention group was further randomized to “conditional” (cash transfer to participant and caregiver dependent on school attendance) or “unconditional” (no requirements to receive payment). Participants included young women who were in and out of school. At 12-month follow-up, **lower risk of pregnancy among programme beneficiaries who were out of school at baseline (RR = 0.70, p <.05)**, compared to control**.** At 18-month follow-up, **lower risk of HIV & HSV-2 among beneficiaries who were enrolled in school at baseline (HIV aOR = 0.36, 95% CI = 0.14-0.91 & HSV-2 aOR = 0.24, 95% CI = 0.09-0.65)**, compared to control. There was no difference between conditional and unconditional groups in HIV & HSV-2 risk. For out-of-school girls/women, the intervention showed no effect on HIV & HSV-2 risk. |  |
| Cho et al. 2011 | Pilot RCT, 105 orphans aged 12-14 | Sexual behavior | Kenya | Comprehensive school support (school fees, uniforms, and “community visitor” who monitored and supported school attendance) offered to intervention group. **At 1-year follow-up, intervention group less likely to drop out of school (4% vs. 12%, p < 0.05) or initiate sex (19% vs. 33%, p = 0.07).**  |  |
| de Walque et al. 2012 | RCT,2399 men & women aged 18-30 with spouses | STI incidence | Tanzania (Kilombero & Ulanga districts) | Individuals were randomized to one of three arms: control arm (n = 1124), low-value CCT of USD$10/month (n=660), and high-value CCT of USD$20/month (n=615). CCT payments were contingent on testing negative for four STIs at 4-month check-ups. Free STI treatment and counseling were offered to all participants. **At 12-month follow-up, the combined STI prevalence at any check-up was lower in the high-value CCT arm (aRR = 0.73, 95% CI = 0.47-0.99**) but not the low-value CCT arm. |  |

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| Hallfors et al. 2011 | RCT, 329 orphan girls aged 10-16 at baseline | School drop-out, early marriage, gender attitudes | Zimbabwe | 25 primary schools were randomized to intervention or control, and all orphan girls in grade 6 were invited to participate in program. Intervention schools received fees, uniforms, and a school-based helped to monitor and support attendance, and all schools received universal daily feeding program. **At 2-year follow-up, control girls were more likely to have dropped out of school (OR = 8.5, p < 0.001) and have married (OR = 2.92, p = 0.02). Intervention girls were more likely to believe they could complete high school, college, and more likely to report waiting to have sex (p < 0.05 for all).** | See also Hallfors et al. 2015 |
| Pronyk et al. 2008 | Cluster RCT, Cohort 2 = 1835 men & women aged 14-35 years  | Sexual behavior | South Africa | IMAGE Study, Cohort 2: Intervention included a microfinance program with participatory training on HIV, gender norms, domestic violence, and sexuality. Cohort 2 was young men & women between the ages of 14 and 35 who lived in households with the intervention beneficiaries. At 2-year follow-up, members of Cohort 2 did not have lower rates of unprotected sex with a non-spousal partner, compared to control cohort. | See also Kim et al. 2007 and Pronyk et al. 2006 |
| Boungou Bazika 2007 | Cross-sectional, 372 youth aged 15-24 | Sexual behavior | Republic of Congo | Income-generating activities (IGA) for HIV prevention were initiated, but the project collapsed. Four years later mixed-methods research found that **only a quarter of the original beneficiaries were involved in IGA; they reported less likelihood of having sex with a new partner without a condom (p < 0.01) than those not involved in IGA**. |  |
| J. C. Kim et al. 2007 | Cluster RCT, Cohort 1 = 860 women aged 18-96 (mean age 42) | IPV | South Africa | IMAGE Study, Cohort 1: Intervention included a microfinance program with participatory training on HIV, gender norms, domestic violence, and sexuality. Cohort 1 was intervention participants/beneficiaries. **At 2-year follow-up, past-year physical or sexual violence by intimate partner was lower in intervention than control (aRR = 0.45, 95% CI = 0.23-0.91)** and a number of other empowerment indicators were higher (although mostly not statistically significantly so). | See also Pronyk et al. 2006 & 2008 |
| Pronyk et al. 2006 | Cluster RCT, Cohort 3 = 3881 men and women aged 14-35 years  | HIV incidence, sexual behavior | South Africa | IMAGE Study, Cohort 3: Intervention included a microfinance program with participatory training on HIV, gender norms, domestic violence, and sexuality. Cohort 3 was randomly selected community members aged 14-35 in intervention communities. At 3-year follow-up, members of Cohort 3 did not have lower rates of unprotected sex with a non-spousal partner or lower HIV incidence, compared to control cohort. | See also J. C. Kim et al. 2007 and Pronyk et al. 2008 |
| Bhana et al. 2004 | Quasi-experimental, 124 families |  | South Africa | A pilot study in South Africa assigned families to receive the *Amaqhawe* program (72 families) control group (52 families), based on availability to participate in intervention over a 10-week period. **Intervention showed significant increase (pre- and post- intervention) in HIV/AIDS knowledge compared to the control group (p < 0.01). Intervention group showed significant shift from passive aggressive & manipulative communication styles to more assertive styles, and increased communication about sensitive topics (p < 0.05). The intervention group showed greater social network support post-intervention compared to control (p < 0.01).** |  |

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| **ART adherence issues [6]** |
| Arage et al. 2014 | Cross-sectional, 440 children aged 0-14, & caregivers | ART adherence | Ethiopia | 78.6% of caregivers reported that their children were ART adherence in previous month. Adherence positively correlated with caregiver knowledge about ART, caregiver lack of substance abuse, child knowing HIV status, and caregiver’s educational status. |  |
| Dachew et al. 2014 | Cross-sectional, 342 children aged 0-15, & caregivers | ART adherence | Ethiopia | 90.4% of children were ART adherent. Adherence positive associated with caregiver knowledge about ART and child knowing HIV status. |  |
| Kenu et al. 2014 | Cross-sectional, 34 youth aged 13-22 | HIV knowledge and disclosure | Ghana | Among 34 young people living with HIV, 18 knew they had HIV and 9 did not know whether they were on ART or not. Caregivers reported in a focus group discussion that they did not disclose HIV status to their wards because of fears of stigmatization and isolation, parental guilt, and fear, and many of them expected the healthcare provider to disclose. |  |
| Mavhu et al. 2013 | Cross-sectional, mixed-method229 children aged 6-18 | ART adherence | Zimbabwe | Quantitative questionnaire administered to HIV+ children attending Africaid support group, and showed that self-reported adherence to ART was “sub-optimal” and psychological well-being was poor. In-depth interviews and FGDs showed that children found group attendance helpful but faced challenges in life outside the group, and caregivers felt ill-equipped to support the children in their care. |  |
| Bygrave et al. 2012 | Prospective cohort, 898 children & adults aged 10-30 | ART outcomes (loss to follow-up, death) | Zimbabwe | Survival analysis estimated rates of death and loss to follow-up, with median duration on ART of 468 days. Young adults (19.1 to 24 yrs) and adolescents (15.1 to 19 years) had 2-3 times higher loss to follow-up compared to young adolescents (10 to 15 yrs), and young adults had the highest risk of attrition combing loss to follow-up and death. |  |

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| Nachega et al. 2009 | Observational cohort study, 154 youth aged 11-19 & 7622 adults | ART adherence | Southern Africa | Virologic suppression was measured among adolescents aged 11-19 and adults at 6, 12, 18, and 24 months after ART initiation, and adherence was assessed by pharmacy refills at 6, 12, 24 months. Adolescents were less likely than adults to achieve adherence at each time point (p < 0.01) and displayed lower rates of virologic suppression and immunologic recovery as well as a higher rate of virologic rebound after initial suppression. |  |
| **Parent-child communication about HIV & sex [20]** |
| Okigbo et al. 2015 | Prospective, 1927 unmarried youth aged 12-19 | Sexual debut | Kenya (Nairobi) | Sexually inexperienced, unmarried adolescents aged 12-19 were interviewed about parental monitoring, parent-child communication, and parental discipline at baseline, and these factors were analyzed in relationship to sexual debut during 1-year follow-up. 6% of participants experienced sexual debut over follow-up, and this was negatively associated with communication with mothers for males (aOR = 0.33, p < 0.05) and with communication with fathers for females (aOR = 0.30, p < 0.05). Parental monitoring and discipline were not significantly associated for either gender. |  |
| Stanton et al. 2015 | Cluster RCT, 2564 youth in grade 10 (mean age 14.5) | HIV knowledge, condom-use skills, self-efficacy, & use | Bahamas | Grade 10 classrooms were randomized to one of 4 arms: 1) control, 2) a classroom-based HIV prevention intervention, 3) a classroom-based intervention plus a youth-parent intervention emphasizing youth-parent communication, 4) a classroom-based intervention plus a parent-only intervention. At 18-month follow-up, the 3rd arm showed increased HIV knowledge, condom-use skills, and self-efficacy compared to control, and had marginally increased condom use. |  |

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| Bingenheimer & Reed 2014 | Prospective, 700 girls aged 13-14 or 18-19 | Coerced sex | Ghana | Girls were interviewed in 2010 and 2012 to assess risk of coerced sex in relationship to household and family factors. 18% of girls had experienced coerced sex at baseline and 13% did between 2010 and 2012. Parental behavioral control was associated with decreased risk of coerced sex while parental conflict was associated with increased risk of coerced sex, although this effect was seen only in cross-sectional analysis and not in prospective analysis. |  |
| Babalola et al. 2013 | Cross-sectional, 2,681 youth aged 15-24 | Youth sexual behavior | Côte d’Ivoire (Abidjan, Korhogo, & Bouake) | Youth aged 15-24 were administered a survey which asked about *inter alia* age at sexual debut, abstinence in past 6 months, and having multiple sexual partners in past 3 months. Youth who lived in the same household as their fathers during childhood, perceived their parents as disapproving of premarital pregnancy, and communicated with parents about abstinence were more likely to report never having had sex & not having had sex in past 6 months, and less likely to report having multiple sex partners. |  |
| Bogart et al. 2013 | Randomized trial, 66 parents & their adolescent children | Parent-youth communication about sex & HIV | South Africa (Cape Town) | Intervention was offered in a workplace, with parents randomized to receive the intervention or wait-listed to receive it at a later time. **Compared to the control arm, parents in the intervention arm were significantly more comfortable talking to their adolescent children about sex after the intervention (p = 0.02), were more likely to have reported discussing sex and HIV-related topics with their children (p < 0.001), and parents’ self-efficacy for condom use was also increased (p < 0.01)** |  |

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| Kajula et al. 2013 | In-depth interviews (44) & FGDs (12) with 114 youth & 20 parents | Parent-child communication about HIV & sex | Tanzania | In-depth interviews (24) and 12 FGDs were carried out with a total of 114 youth aged 12-15 and in-depth interviews with 20 of their parents. Youth and parents agreed that although some communication had occurred about risk of HIV & sexual mores, they had not communicated about pregnancy, FP, and condom use. Parental communication was mostly fear-based, involving threats rather than bi-directional communication, and focused on morality and “bad” behaviors to avoid (rather than describing good behaviors). Parents often did not communicate accurate information about HIV, and children were left confused. |  |
| Namisi et al. 2013 | Prospective panel study, 6,251 youth, mean age 13 or 14 years (varied by site) | Youth preferences for sexuality communication | South Africa (Dar es Salaam) & Tanzania (Cape Town, Mankweng) | Using data from three waves of data collection from control schools only (see Mathews et al. 2012 for more information on study design), communication with significant adults (parents, other adult family members, teachers) was found to be associated with and significantly predict consistent condom use. | See also Mathews et al. 2012 & Namisi et al. 2009 for additional results from same trial. |
| Crichton et al. 2012 | FGDs (14) & interviews (25) with girls aged 12-17, mothers, and teachers | Mother-daughter communication about sexuality | Kenya (Nairobi) | 14 FGDs carried out with 125 participants, and 25 interviews with girls aged 12-17, mothers, and teachers. Many girls and women reported that mothers are the best source of information about sexual maturation, abstinene, and unintended pregnancy, but only a minority had good experiences with such communication. Communication was better when mothers were available, perceived as being warm, and when mother-daughter relationships were close. |  |
| Sidze & Defo 2012 | Retrospective, 447 unmarried youth aged 15-24 | Parent-child relationship quality and youth sexual behavior | Cameroon | Using retrospective data from the Cameroon Family and Health Survey (1996-7), parent-child relationship quality was assessed in relationship to youth sexual behavior for unmarried youth aged 15-24. The higher the quality of parent-child relationships, the lower the likelihood of young males having multiple sexual partners (OR = 0.63, p < 0.05) or of young females being sexually active (OR = 0.51, p < 0.10) or having multiple sexual partner (OR = 0.64, p < 0.10). |  |

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| Dimbuene & Defo 2012 | Retrospective, 1,182 youth aged 12-24 | Age of premarital intercourse | Cameroon | Using retrospective data from the Cameroon Family and Health Survey (1996-7), median age at premarital intercourse was calculated for youth aged 12-24 (n=1182). 42% of sample had experienced pre-martial intercourse and median age was 17.7 for youth from nuclear 2-parent families, higher than for other types of families including one-parent nuclear families (16.7) and orphans (16.1). |  |
| Vandenhoudt et al. 2012 | Prospective, 375 parents of youth aged 10-12 | Parenting skills & parent-child communication about sexuality | Kenya (Nyanza Province) | Families Matter! Program (FMP): Parents and other caregivers (collectively called “parents”) of youth aged 10-12 were randomized to attend the 5-session FMP intervention. Only one parent from each household could attend (decision made by parents). Interviews of children and participating parents were carried out via audio computer-assisted self-interview (ACASI) at baseline and 1 year post intervention. The intervention was highly acceptable: 93% of parents who were invited participated, and 94% of those attended 5 of 5 sessions. **Parents and children in the intervention arm reported increased parental monitoring and communication about sexuality and sexual risk reduction.** |  |
| Wamoyi et al. 2011 | Participant observation, FGDs, in-depth interviews with youth aged 14-24 & their parents | Impact of socio-economic changes on parental influence on youth sexual behavior | Tanzania | Participant observation, FGDs, and in-depth interviews showed that young people often contributed to the economic needs of their families, and that this led to youth having decision-making power and less behavioral control of children by parents. Parents and young people spent less time together than in previous generations, and parents reported thinking that their children were more knowledgeable about SRH than they in fact were. |  |
| Bastien et al. 2009 | Cross-sectional, 993 out-of-school youth & 1007 in-school youth (all age 13-18)  | Youth exposure to HIV information & communication | Tanzania (urban & rural) | Structured interviews held with in-school (via self-administered questionnaire) and out-of-school youth (via face-to-face interview). Both in-school and out-of-school youth identified parents as one of the top 3 preferred communicators of sexual and reproductive health information (along with friends and doctors), and in-school youth ranked parents in top 3 in terms of credibility. |  |

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| Biddlecom et al. 2009 | Cross-sectional, unmarried youth 15-19 | Sexual behavior | Ghana, Malawi, Uganda, Burkina Faso | Nationally-representative surveys assessed sexual intercourse in past 12 months and contraceptive use at last sex among unmarried youth aged 15-19. Youth reported moderate to high levels of parental monitoring, but low levels of parental communication about sexual matters. Low parental monitoring was associated with greater likelihood of having had sex in past year in all 4 countries for males (ORs = 2.4 to 5.4) and in 3 countries for females (ORs = 6.9 to 7.7), but was not associated with contraceptive use. Communication with parents about sexuality was positively associated with sexual activity among Malawian males and Ugandan females, and with contraceptive use among Ghanaian females and Ugandan males and females. |  |
| Namisi et al. 2009 | Cross-sectional, 14,944 youth, mean age 13 or 14 years (varied by site) | Youth preferences for sexuality communication | South Africa (Dar es Salaam) & Tanzania (Cape Town, Mankweng) | A 3-site baseline survey for behavioral RCT (see Mathews et al. 2012) showed that girls preferred to receive sexuality information from mothers, while boys preferred to receive this information from fathers, although 37% reported never or hardly ever communicating about sexuality with parents, 41% never/hardly ever with other adult family members, and 29% never/hardly ever with teachers (whether boys or girls reported higher “silence” varied by site). | See also Mathews et al. 2012 & Namisi et al. 2013 for additional results from same trial. |
| Izugbara 2008 | In-depth interviews with 187 parents | Parent-adolescent discussions about sexuality | Nigeria (rural) | In-depth interviews held with 187 parents in rural Nigeria. Cultural norms discourage parent-child discussions about sexuality, and parents portray sexuality as “dangerous, unpleasant, and unsavory”. |  |
| Kawai et al. 2008 | Prospective, 2477 youth aged 12-14 | Sexual debut, youth-parent & youth-teacher communication about sex | Tanzania (Dar es Salaam) | Virgin primary school students (n=2477, aged 12-14) were followed for 6 months to assess sexual initiation. 27% reported communicating about HIV & sex with parents, although this was not associated with timing of sexual debut. 36% communicated with teachers about HIV & sex, and this was associated with delayed sexual debut (aOR = 0.59, 95% CI = 0.40-0.89, p = 0.01). |  |

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| Phetla et al. 2008 | Cluster RCT + qualitative methods | Parent-child communication about sex | South Africa | Mother-child participants in the IMAGE trial (Cohorts 1 & 2) were assessed using quantitative and qualitative measures. **Mothers in the intervention arm were found to be more likely to communicate with children about sex, compared to control (80% vs. 49%, aRR = 1.59, 95% CI 1.31-1.93).** The content of their communication had also shifted from “vague admonitions about the dangers of sex to concrete messagesabout reducing risks”. | For further description of the IMAGE trial, see Kim et al. 2007 and Pronyk et al. 2006 & 2008. |
| Vuttanont et al. 2006 | Mixed-methods, surveys with 2301 youth & 351 parents, 20 FGDs with youth & 2 FGDS with parents, KI interviews, analysis of key policy documents | Sex education needs of teenagers | Thailand (Chiang Mai) | Mixed-methods study in 6 secondary schools in Chiang Mai which began with review of key policy documents and key informant (KI) interviews with 15 public health specialists, sex education policymakers, local religious leaders, and schoolteachers. Surveys were then self-administered to 2301 youth (aged 12-21, median age 15) & 351 parents, 20 FGDs with youth & 2 FGDS with parents. Surveys and FGDs addressed ASRH, including knowledge and attitudes. The most prominent theme which emerged was the coexistence of conflicting social and cultural influences which impacted teenagers, particularly widespread media portrayal of sex and sexuality. Youth reported that they aspired to modern relationships and gender roles, including dating and premarital sex, but also valued modesty and virginity (in girls) and obedience to parents. |  |
| Adu-Mireku 2003 | Cross-sectional, 894 students mean age 17.4 | Parent-child communication about HIV & youth sexual behavior | Ghana (Accra)  | Students at two secondary schools were self-administered a questionnaire. 74% had talked with parents or other family members about HIV/AIDS, and these students were more likely to have used a condom at last sex although no more or less likely to report sexual activity. |  |

# Appendix 2: Characteristics of effective curriculum-based programs

Characteristics of effective curriculum-based sex and HIV programs for young people, from Kirby et al. 2007



1. In keeping with common usage, throughout this review “adolescents” will refer to young people between the ages of 10 and 19 years, while “young adults” will refer to young people between the ages of 20 and 24 years. “Youth” and “young people” will be used to refer to individuals between the ages of 10 and 24 years. [↑](#footnote-ref-1)
2. This information, as well as further information about the Teen Clubs, can be found at www.http://bipai.org/About-BIPAI/Teen-Club-International [↑](#footnote-ref-2)
3. More information about the intervention, including teacher manuals and student workbooks, is available at http://prepare.b.uib.no/project-summary-satz/. [↑](#footnote-ref-3)
4. More information, including resources for implementation, is available at www.psabh.info. [↑](#footnote-ref-4)
5. More information about Restless Development, including toolkits and curricula, can be found at www.restlessdevelopment.org. [↑](#footnote-ref-5)
6. Stepping Stones is a training package on gender, HIV, communication and relationship skills that has been used in dozens of countries around the world and translated into 30 languages. More information, including manuals and other resources, is available at www.steppingstonesfeedback.org. [↑](#footnote-ref-6)
7. This information taken from [www.unfpa.kg/en/programmes/youth/y-peer/](http://www.unfpa.kg/en/programmes/youth/y-peer/). A peer education toolkit produced for Y-PEER is available at [www.unfpa.org/resources/peer-education-toolkit](http://www.unfpa.org/resources/peer-education-toolkit). Y-PEER’s website (youthpeer.org) appears to be defunct although Y-PEER has an active Facebook page and Twitter account. [↑](#footnote-ref-7)
8. More information, including information about program materials and manuals, is available at <http://www.cdc.gov/globalaids/resources/prevention/docs/fmp-2-pager-final-12.11.14.pdf>. These materials do not appear to be readily available online but according to this PEPFAR/CDC publication are available from the CDC. [↑](#footnote-ref-8)
9. See Bhana et al. 2004 for examples of the cartoon storyline; a full program manual does not seem to be available online. [↑](#footnote-ref-9)