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To cite this article: Mandy Swann (2018) Economic strengthening for HIV prevention and risk reduction: a review of the evidence, *AIDS Care*, 30:sup3, 37-84, DOI: [10.1080/09540121.2018.1479029](https://doi.org/10.1080/09540121.2018.1479029)

To link to this article: <https://doi.org/10.1080/09540121.2018.1479029>



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Published online: 08 Jul 2018.



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Economic strengthening for HIV prevention and risk reduction: a review of the evidence

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ABSTRACT

Household economic strengthening (HES) is increasingly implemented alongside HIV programming to address economic drivers of the epidemic. The evidence base on HES for HIV outcomes is growing, and this evidence review aimed to comprehensively consolidate and synthesize the research linking 15 types of HES interventions with a range of HIV prevention and treatment outcomes. The review was conducted between November 2015 and October 2016 and consisted of an academic database search, citation tracking of relevant articles, examination of secondary references, expert consultation, and a gray literature search. Studies were included if they evaluated an HES intervention(s), reported on an HIV outcome(s), were available in English, and were relevant to low-income contexts or vulnerable populations. All evidence was assessed for quality. Over 108 citations were included and a matrix framework was used to map the evidence, linking each HES intervention with each HIV outcome, providing a precise visual depiction of the evidence base.

Given the volume of evidence, the results are presented and discussed in three papers, each focused on a different HIV outcome area. This is the first paper in the series and focuses on the 64 studies that reported HIV prevention outcomes. Conditional and unconditional cash transfers, and educational support were each associated with reductions in self-reported risk behaviors, particularly among adolescents. Food assistance in combination with other support also shows a positive trend for adolescent risk reduction. Most studies relied on self-reported behavioral data, and clinical outcomes such as HIV or other sexually transmitted infection (STI) incidence or prevalence were mostly null or underpowered, calling into question the true effectiveness of these interventions in preventing HIV. Limited evidence also supports the effectiveness of financial incentives in increasing voluntary medical male circumcision. Well-designed vocational/entrepreneurial training and savings interventions could bolster HIV prevention efforts for female sex workers, while findings are less conclusive for adolescents.

ARTICLE HISTORY

Received 19 February 2018
Accepted 17 May 2018

KEYWORDS

Evidence review; economic strengthening; HIV prevention; risk reduction

Introduction

Economic status has long been recognized as an important structural driver of the HIV epidemic (Gupta, Parkhurst, Ogden, Aggleton, & Mahal, 2008). Although the relationship between poverty and HIV is not linear (Kim, Pronyk, Barnett, & Watts, 2008), economic factors are linked to HIV risk behaviors, as well as outcomes at all stages of the HIV care and treatment cascade (Centers for Disease Control and Prevention, 2014). Poverty and economic insecurity can affect HIV risk by reducing negotiating power within sexual relationships (Eaton, Flisher, & Aarø, 2003), increasing reliance on transactional sex and sex work (Seeley et al., 2012), or limiting access to HIV prevention knowledge and services (Hargreaves et al., 2008).

Economic factors also pose barriers to HIV testing services (HTS) and routine access to care and treatment

services for those who are positive, compromising the health and survival of people living with HIV (PLHIV). Transportation costs, time away from productive economic activities, and the costs of medical services are known barriers to care and treatment (Weiser et al., 2003). Poverty is also associated with food insecurity, which contributes to immunologic decline and reduces antiretroviral therapy (ART) adherence (Kalichman et al., 2014). Not accessing services and not adhering to treatment, in turn, have negative implications for onward transmission.

To address economic drivers of the epidemic, household economic strengthening (HES) initiatives are increasingly being implemented in coordination with biomedical and behavioral approaches to HIV prevention, treatment, and care. HES refers to a broad range of program approaches to improve economic wellbeing at the household level, often implemented as part of

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Table 1. HIV outcomes assessed in full evidence review.

HIV outcomes	
Prevention (clinical outcomes, risk behaviors, and gender-based violence/intimate partner violence) Onward transmission (prevention with PLHIV, PMTCT)	Current paper
HIV testing services (HTS)/diagnosis Linkage to HIV care	Swann (2018a)
Retention in HIV care Adherence to antiretroviral therapy (ART)/viral suppression Morbidity Mortality	Swann (2018b)

multi-sectoral interventions (Wolfe, 2009). The effects of HES interventions on HIV outcomes are likely mediated by structural and context-specific factors, however these interventions have the potential to mitigate economic vulnerability to HIV-related risk factors and help PLHIV overcome financial barriers to initiating and staying in care. In addition, the field of behavioral economics uses interventions that provide tangible economic rewards to influence decision-making and motivate specific prevention and treatment behaviors (Bassett, Wilson, Taaffe, & Freedberg, 2015; Galárraga, Genberg, Martin, Laws, & Wilson, 2013; Pettifor, MacPhail, Nguyen, & Rosenberg, 2012).

A growing body of evidence links HES interventions to HIV outcomes. This literature review was intended to comprehensively document the published and gray literature on a broad set of HES intervention types and their effects on a range of HIV outcomes. Given the volume of evidence, the review is presented in three papers, each focused on a different HIV outcome area: prevention, testing and linkage to care, and ART adherence and retention in care. This first paper in the series focuses on HIV prevention outcomes (Table 1).

Methods

The methods cover the processes used for the complete review, including outcomes related to prevention, HTS and care and treatment.

Search strategy for full evidence review

The search methodology consisted of an academic database search, citation tracking of relevant articles, and an examination of existing evidence reviews for relevant primary articles. The initial search was completed using nine academic databases (PubMed, Embase, EconLit, Academic Search Premier, CINAHL Plus, Global Health, Web of Science, Campbell Collaboration, and Cochrane Library). Four consistent search strings were entered into each database using a list of HES interventions, plus terms associated with different HIV outcomes such as sexual risk behavior or ART adherence, or population groups such as orphans and vulnerable children (OVC) or female sex workers (FSW) (Appendix 1).

The literature search was conducted in November 2015 without restrictions on publication dates. Included evidence had to meet the following criteria: (1) evaluated one or more HES intervention of interest, (2) reported on at least one HIV outcome of interest, (3) available in English, and (4) relevant to low-income contexts or vulnerable populations. There were no geographic exclusion criteria, but studies conducted in high-income countries were only included in the review if the intervention and findings were relevant to low-income or otherwise vulnerable groups. Two reviewers screened titles and abstracts for inclusion; where insufficient information was available, the publication was included in the full-text review. Five percent of the abstracts ($n = 160$) were screened by both reviewers with 98.8% agreement in classification, and differences were resolved through consensus. Selected records then underwent a full-text review by the study author. There were no exclusion criteria based on study design. Data on study characteristics were extracted by two reviewers using a standard template.

Using a citation tracking approach, the reference sections of all selected papers were screened for additional pertinent research. An additional thirty-eight evidence reviews and policy papers identified in the initial screening were also reviewed for relevant source studies. For all primary studies identified through citation tracking, the same inclusion criteria were applied.

In July 2016, recommendations for additional evidence were solicited from experts in this field through a half-day consultative meeting. These recommendations were subsequently reviewed for inclusion. Finally, a gray literature search was conducted from September to October 2016 in which 15 websites of donors, conferences, and implementing organizations were searched using terms relevant to the review. The same inclusion criteria noted above were applied.

Study classification

We employed the Department for International Development's *Assessing the Strength of Evidence* methodology to appraise evidence quality from a wide range of study designs (DFID, 2014). This assessment tool has 20 questions grouped under seven principles of quality: conceptual framing, transparency, appropriateness, cultural sensitivity, validity, reliability, and cogency. This method was selected for its focus on development research and broad applicability. It assesses how well the study was conducted relative to the research question, and ratings are interpreted within the context of the study design and methods.

The methodology was standardized through the creation of a codebook for consistent scoring of each question (Appendix 2). Each of the 20 questions received a score of 1

(weak), 2 (moderate) or 3 (high). For each of the seven principles, the scores for each question were averaged, providing a principle score between 1 and 3. The scores for each principle were then summed, resulting in an overall quality score between 7 and 21. Studies were then rated based on pre-defined cut-off points as follows: 7.00 to 13.99 (low), 14.00 to 15.74 (medium), 15.75 to 17.49 (medium-high), and 17.50 to 21.00 (high). The rating parameters were based on average principle scores of less than 2.00 (low), 2.00 to 2.24 (medium), 2.25 to 2.49 (medium-high), and 2.50 to 3.00 (high). After two rounds of pre-testing, two reviewers completed the assessment, and 20% of the included studies, selected randomly, were reviewed jointly and discussed to support intercoder reliability. This assessment was only applied to written articles ($n = 95$) as there was insufficient information to complete the assessment for conference abstracts and presentations.

In addition to quality, studies were classified in terms of their direction(s) of effect. For quantitative studies, individual findings were classified as positive or negative if the results were statistically significant according to a $p \leq 0.05$ threshold. Where tests of statistical significance were not conducted/presented, results were classified as null even when directional trends were strong. For qualitative studies, results were classified as positive or negative based on the qualitative data and interpretations presented.

Many studies in this review evaluated the effectiveness of integrated programs, grouping multiple HES, health, and/or social support components. The assessment of

an independent relationship does not equate to attribution of the outcome to the intervention, but is an important consideration when evaluating the strength of evidence for each intervention. Therefore, studies were classified and analyzed based on whether they assessed the independent relationship between a specific HES component and the outcome(s) of interest.

Results

High level results are first presented for the complete evidence review, including studies related to prevention, HTS, and care and treatment. This is followed by a detailed discussion of results for prevention outcomes only.

Results for full evidence review

For the full evidence review the initial database search yielded 3164 unique records. Based on the abstract screening, 291 records underwent full-text review. This resulted in 56 relevant primary research studies that met inclusion criteria. Through citation tracking 91 additional full-text records were reviewed, 26 of which were included. Twenty-two additional studies were identified through participants at the consultative meeting, 16 of which met the inclusion criteria. Finally, 32 citations were identified through the gray literature search, and 10 were included. A total of 108 pieces of evidence were included in the review (Figure 1).

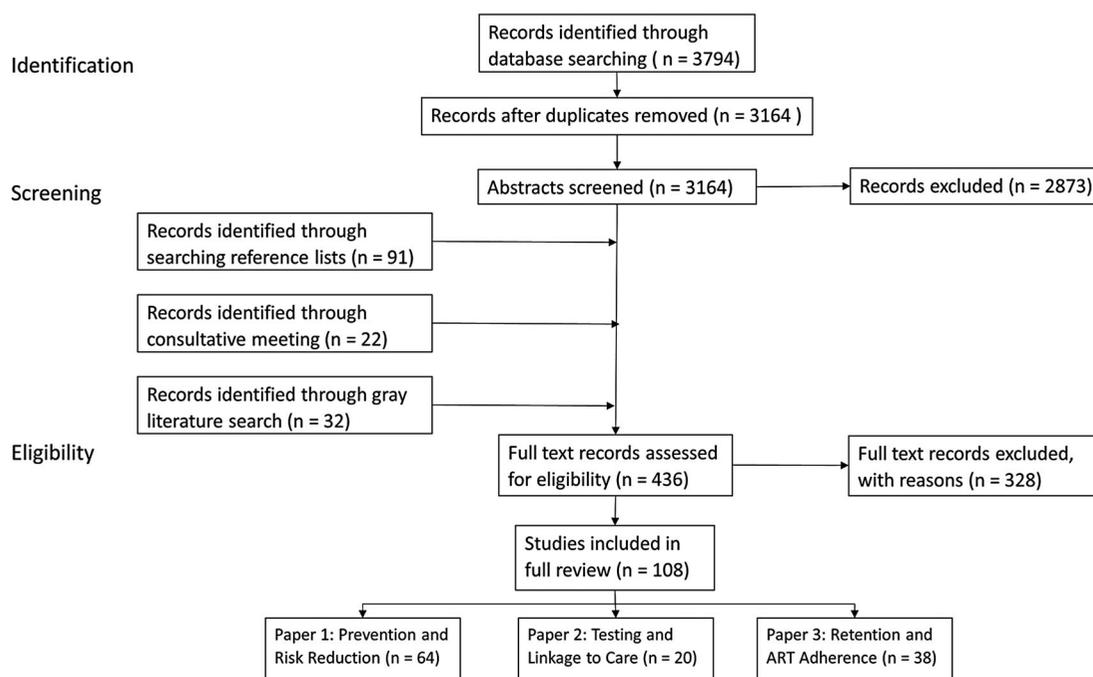


Figure 1. PRISMA diagram on selection of studies for full review.

Study characteristics for full evidence review

Included studies were conducted in 24 countries across five continents. Variation was observed in the number of studies for each HES intervention and HIV outcome (Figure 2). No studies were identified that assessed either asset transfers or microinsurance, therefore these interventions are not discussed.

Nearly 54% assessed a prevention outcome, including clinical outcomes, risk behaviors, and/or gender-based violence (GBV)/intimate partner violence (IPV) (Figure 3).

Figure 4 outlines the distribution of studies by quality rating

Most studies ($n = 80$) were classified as having a positive direction of effect for at least one outcome, indicating they had positive findings on at least one primary indicator for that outcome, with no negative findings (though many had a mix of positive and null results across different indicators or sub-groups). Only 10% of the studies had any negative primary outcomes.

Almost half (45%) of the studies evaluated the effectiveness of integrated interventions with multiple components. Of these, few (18%) isolated the effects/associations of each intervention component, assessing both the combined and independent associations with the outcome of interest.

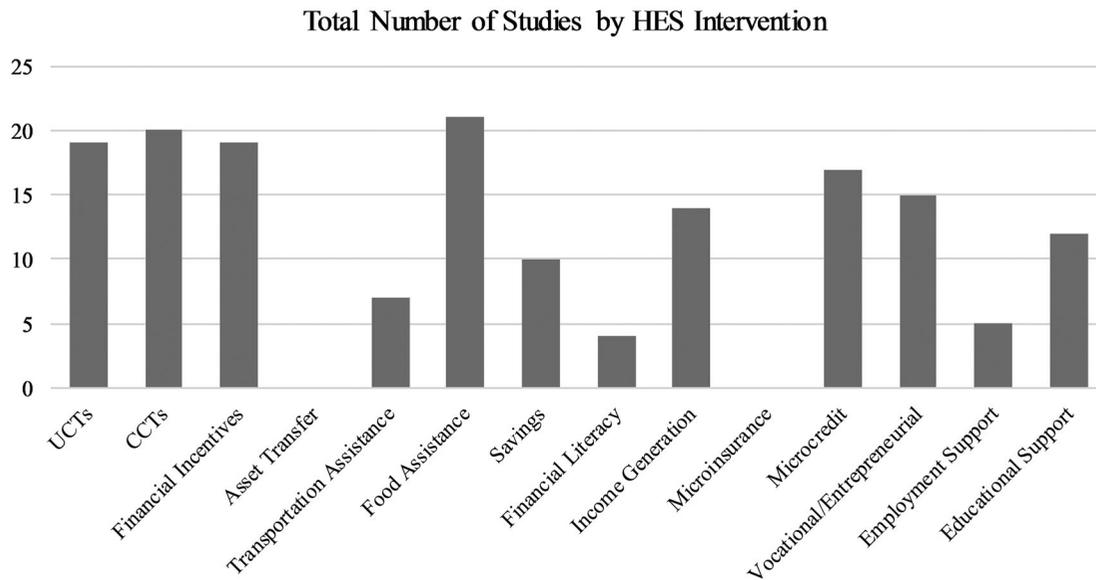


Figure 2. Number of studies by HES intervention for full review.

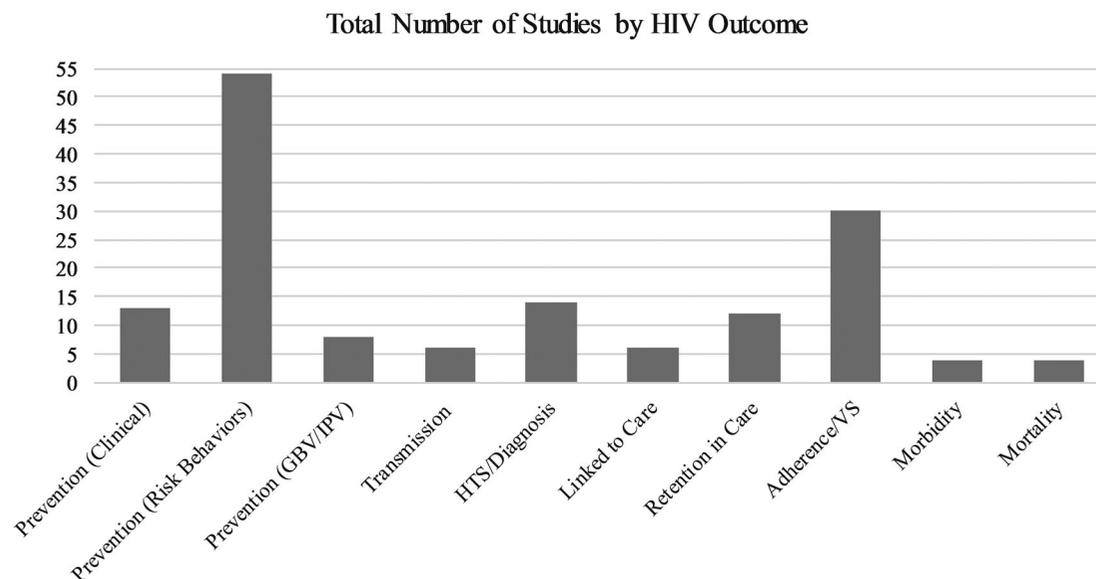


Figure 3. Number of studies by HIV outcome for full review.

Total Number of Studies by Quality Rating

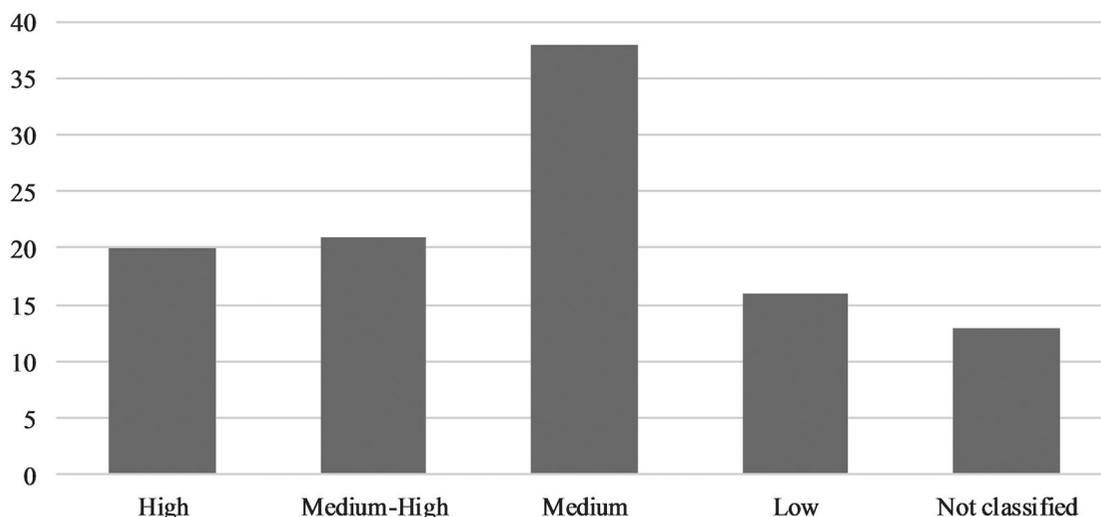


Figure 4. Number of studies by quality rating for full review.

Evidence map

A matrix framework modeled from the International Initiative for Impact Evaluation Evidence Gap Map methodology was used to map evidence for each intervention onto each HIV outcome, creating a visual depiction of the overall evidence base (Snilstveit, Vojtkova, Bhavsar, Stevenson, & Gaarder, 2016) (Figure 5). Each circle represents a single study and, within each cell, a study is only included once. Studies are included in multiple cells when they assessed more than one intervention or reported on multiple outcomes, or both. The characteristics mapped for each study are: study quality (represented by size), direction of effect (represented by color),¹ and whether the study assessed the effects of that HES intervention independently or in combination with other program elements, or both (represented by shading). Studies with insufficient information to complete the quality assessment are depicted as squares and their size is unrelated to quality. Where multiple papers from the same study present different analyses of the same data and outcomes for an intervention-outcome pair are not substantively different, they are only captured once in the evidence map. Similarly, qualitative sub-studies that provide additional context for results previously reported are not captured in the evidence map.

HES interventions can be classified into three categories: provision, protection, and promotion. Provision interventions directly provide economic resources to support basic needs and should target destitute households. Protection interventions help more economically stable households smooth consumption and mitigate shocks, and promotion interventions build the capacities

of households capable of investing or assuming risk to grow their assets (Woller, 2011). The HES interventions in this review are grouped under these larger categories. Throughout this three-part series, results are presented by individual HES intervention, and are discussed in the context of these wider categories. Descriptions for each HES intervention are provided in Table 2.

Results for prevention outcomes

Prevention outcomes were limited to clinical outcomes of HIV or sexually transmitted infection (STI) incidence or prevalence within the study population, behavioral risk factors such as self-reported condom use or partner reduction, and known vulnerabilities such as GBV or early marriage. Interventions with PLHIV aimed at disrupting onward transmission are also included. Less direct outcomes such as prevention knowledge or intentions were not included, nor were more distal outcomes such as alcohol abuse and school attendance. Most of the studies in this paper are based on self-reported measures of risk which can be susceptible to bias; this should be considered when interpreting the findings.

Given the diversity in study characteristics – geography, target group, intervention implementation, study design, sample size, outcome indicators, analysis methods, and overall study contexts – in most cases the studies in this review have only limited comparability. The summaries of literature for each intervention instead highlight patterns within these characteristics but do not seek to explicitly compare the studies. Even when the same outcome was measured, variation in these characteristics as well as different analysis methods

Outcomes

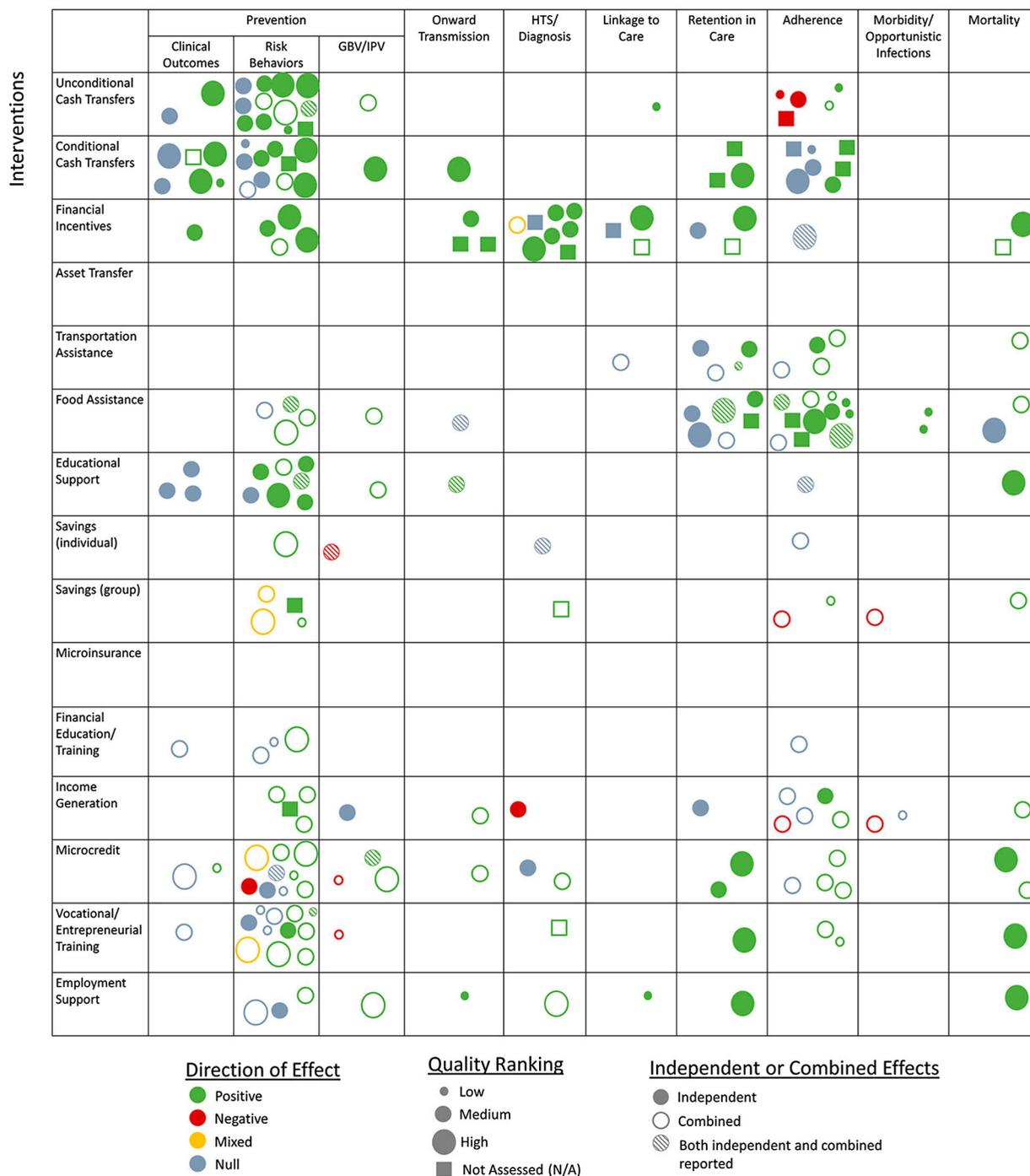


Figure 5. HES and HIV outcomes evidence map for full review.

make it difficult to directly compare effect sizes between studies. The study characteristics and effect sizes are summarized in Tables 3–13, providing important information when interpreting these results. Where studies included multiple HES interventions they are discussed in each relevant section. No studies with prevention outcomes included transportation assistance, so that intervention is not discussed in this paper.

Provision interventions

Unconditional cash transfers. Fourteen studies were identified that assessed unconditional cash transfers (UCTs) for HIV prevention outcomes, nine of which included government-administered transfers (Table 3). Of these, four were high quality, while three were medium-high, five were medium, and one was low quality; one was not assessed. Amounts ranged from USD 5 to

Table 2. HES interventions assessed in full evidence review.

HES interventions	Descriptions
Unconditional cash transfers (UCTs)	UCTs are a common form of social protection that provide basic consumption support to stabilize vulnerable individuals or households. Without specific conditions that must be met by participants to receive the transfer, or rules for how the money must be spent, they are less complex than conditional cash transfers (CCTs) to administer and are often favored in large-scale government social protection programs. UCTs generally aim to increase access to food or social services such as health care or education, and may be intended to influence specific behaviors, such as caring for OVC, though this is done indirectly by increasing household income (Heise, Lutz, Ranganathan, & Watts, 2013).
Conditional cash transfers (CCTs)	Like UCTs, CCTs aim to provide consumption support to targeted households, but require the ongoing fulfillment of conditions. Conditions are intended to improve uptake of key services and incentivize protective behaviors, but can be difficult for highly vulnerable individuals or households to comply with, which can influence the groups to which CCTs are targeted. The CCT studies identified involved nongovernmental organization programs and research efforts, rather than large-scale government CCTs which are less common in the regions of Africa hardest hit by HIV (Adato & Bassett, 2012). Because of this, some of the interventions were only provided for a short time, though classification as a CCT was based on their expected application in a real-world setting where transfers would likely be more reliable over time.
Financial incentives	In this review, financial incentives are defined as cash or non-cash rewards (gift cards, vouchers, etc.) or lottery schemes, used to directly incentivize specific behaviors or outcomes. Unlike CCTs and UCTs, they are not designed to be ongoing predictable sources of support.
Asset transfer	Asset transfers include the provision of an item of value, either to support basic household needs or for generation of income. All studies that provided assets to participants also included related support for income generation and therefore were classified under that intervention.
Transportation assistance	Long distances and transportation costs are demonstrated barriers to a range of health services, including HTS and HIV-related care and treatment (Lankowski, Siedner, Bangsberg, & Tsai, 2014). Transportation assistance seeks to overcome these barriers by covering all or part of the costs associated with transport to health facilities. Although other financial incentives or transfers may be used for transport, they motivate behavior in less prescriptive ways.
Food aid/assistance	Food assistance includes food rations, as well as school feeding and food gardens. These interventions can be used to decrease food insecurity, which is a known barrier to HIV prevention, as well as incentivize desired behaviors (Anema, Vogenthaler, Frongillo, Kadiyala, & Weiser, 2009). This review did not include literature on nutritional support provided to clinically treat malnutrition, and instead focused on interventions that used economic targeting criteria rather than (or in addition to), biomedical criteria. ^a
Educational support	Children in HIV-affected households face disadvantages that can hinder their ability to get an education, including economic strain and responsibilities to care for ill family members (Cluver, Operario, Lane, & Kganakga, 2012). Children who have lost one or both parents to HIV often fall behind their peers on a range of measures related to school attendance and performance, and educational attainment (Guo, Li, & Sherr, 2012). Educational support mitigates economic barriers to education access by paying school fees and/or providing school supplies.
Savings (individual and group)	Savings interventions help participants build liquid assets to pay for lump-sum expenses and cope with unexpected life events. Savings services support the accumulation of long-term savings, which is typically difficult for poor households (Rutherford, 2000), and include individual formal or informal savings accounts, matched savings accounts, and savings and lending groups.
Microinsurance	Microinsurance services offer protection against specific risks or shocks in exchange for regular premium payments. These services are provided to individuals who cannot afford, or do not qualify for, traditional insurance schemes. No studies were identified that included this intervention.
Financial capabilities education/training	As financial services become more available to the poor, efforts to enhance the financial capabilities required to leverage these opportunities have been recognized as a key component of financial inclusion (Deb & Kubzansky, 2012). Relevant interventions help participants learn fundamental financial principles and skills, such as budgeting, saving, borrowing, and using formal financial services.
Income generation	Income generating activities (IGAs) include support for small-scale, often informal business initiatives that are typical in resource-constrained contexts. IGAs generally include training to build fundamental skills and the provision of basic business inputs, and can be implemented individually or in groups.
Microcredit	Microcredit services aim to alleviate poverty by providing loans to people who typically lack access to, or are not considered creditworthy, by traditional financial institutions. These loans are generally intended to support small or micro enterprises. Often delivered through solidarity groups, they differ from savings groups because they focus on receipt and repayment of loans from an external party, rather than from pooled savings.
Vocational or entrepreneurial training	Vocational training helps poor households build their economic capacity by developing technical skills required to enter specific trades. Entrepreneurship training builds the capacity of participants to start and run their own businesses. Training programs are often accompanied by placement in apprenticeships or support for developing a business.
Employment support	Employment support builds the capacity of participants to obtain formal wage-based employment. Interventions, often aimed at young people, include employability and soft skills training, career counseling, and job placement. In this context employment support is also delivered to PLHIV who have recovered their health and are re-entering the workforce.

^aIn many contexts, clinical interventions provide therapeutic foods with the aim of treating malnutrition among PLHIV and other vulnerable groups. These interventions use biomedical criteria such as body-mass index for targeting. They differ from other food assistance programs, which aim to improve access to food and alleviate the economic burden of accessing food, and which target recipients either at a population level or using food security or economic vulnerability criteria. Interventions providing food for the clinical treatment of malnutrition were not included as they are outside the scope of HES.

Table 3. Studies of unconditional cash transfers on HIV prevention outcomes.

Author & date	Location	Study population	Study design	Intervention	Main results	Quality ranking
Baird et al. (2012)	Zomba, Malawi	1706 never married young women age 13–22 (schoolgirls and school dropouts)	Cluster randomized trial comparing CCT recipients, UCT recipients, and non-recipients	CCT (based on at least 80% school attendance) and UCT participants received from USD 1–5/month and their parents received from USD 4–10/month for 2 years	For schoolgirls, after 18 months HIV and HSV-2 prevalences were significantly lower in the UCT and CCT groups (HIV = 1.2%, HSV-2 = 0.7%) compared to controls (HIV = 3%, HSV-2 = 3%). No differences on these measures were seen between intervention and control for school dropouts, nor between the UCT and CCT arms. After 12 months, sexual intercourse at least once a week was significantly lower for the intervention group than controls, for both schoolgirls and dropouts. For schoolgirls only, having a sexual partner 25 or older was lower for intervention participants than controls.	High
Cluver et al. (2013)	Mpumalanga and Western Cape, South Africa	3401 adolescent boys and girls age 12–18	Propensity score matched case-control study comparing the sexual HIV risk behavior of adolescents in households receiving a grant with those in non-recipient households	Receipt of a government issued Child Support Grant (ZAR 280 or USD 35 per month) or Foster Child Grant (ZAR 770 or USD 96 per month) for at least 1 year	For girls, cash transfer recipients had a significantly lower incidence of transactional sex (OR = 0.49, $p = 0.028$) and age-disparate sex (OR = 0.29 $p = 0.004$), but the likelihoods of having unprotected sex, multiple partners, or sex while drunk were not significantly different. For boys, cash transfers were associated with protective trends but no statistically significant results were observed.	High
Cluver et al. (2014)	Mpumalanga and Western Cape, South Africa	2668 adolescent boys and girls age 12–18	Prospective observational study with random sampling to assess the relationship between receipt of social services (“cash,” “cash plus care,” or “no support”) and HIV risk behaviors	“Cash” defined as household receipt of a child support grant or foster care grant, school feeding, and/or food gardens; “cash plus care” adds receipt of teacher social support and/or positive parenting	At 1 year follow up, cash alone was associated with a reduction in the incidence of combined HIV-risk behaviors (OR = 0.63, $p = 0.02$); cash plus care was more effective (OR = 0.55, $p = 0.007$). At follow up, incidence of HIV-risk behavior was 41.2% for girls with no support, 24.5% with cash support, and 15.4% with cash plus care. For boys, cash alone was not associated with lower HIV risk behaviors, but cash plus care was (OR = 0.50, $p = 0.005$). At follow up, incidence of HIV risk behavior was 42.1% for boys with no support and 17.0% for boys with cash plus care.	High
Cluver, Orkin, Meinck, Boyes, and Sherr (2016)	Mpumalanga and Western Cape, South Africa	2668 adolescent boys and girls age 12–18	Prospective observational study with random sampling to examine the potential pathways from structural disadvantage to adolescent HIV risks, and the effect of cash and care types of social protection on adolescent HIV risk pathways	Types of social protection assessed included cash or cash-in-kind (receipt of a child-focused cash transfer, free schooling and books, free school feeding daily, and/or food gardens), and “care” (positive parenting, good parental monitoring, and/or teacher social support)	At 1 year follow up, for both girls and boys, cash or cash-in-kind moderated the pathway from structural drivers to psychosocial problems (i.e., abuse, behavior problems, school dropout, and mental health distress), and from psychosocial problems to HIV risk ($p < 0.001$). Social protection was most effective for adolescents for whom structural and	High

Cluver, Orkin, Yakubovich, and Sherr (2016)	Mpumalanga and Western Cape, South Africa	2668 adolescent boys and girls age 12–18	Prospective observational study of all households with an adolescent to assess the relationship between receipt of social services and HIV risk behaviors	Receipt of any of 14 social protection interventions, including a child-focused cash transfers, household pensions, free schooling, school supplies, school feeding, food gardens, food aid, parental support and monitoring, and teacher support	psychosocial drivers place them at highest risk for HIV. At 1 year follow up, economically motivated sex was significantly lower for girls receiving child grants (AOR = 0.51, $p = 0.007$), but not boys. When combined with free schooling and parental monitoring, greater reductions in economically driven sex among females were seen. No associations were found between child-focused grants the outcome of incautious sex.	Med-high
Galárraga et al. (2017)	Mexico City, Mexico	227 male sex workers age 18–40	Randomized control trial (RCT) to assess the ability of economic incentives to motivate self-protection and health-seeking behaviors	Intervention arms 1 and 2 received food vouchers worth either USD 50 or USD 75, respectively, if they were free of new STIs at months 6 and 12. Intervention arm 3 received unconditional vouchers of USD 50 at months 6 and 12, regardless of STI status. All participants received prevention information/support.	Over an 18-month follow-up period (12 months intervention and 6 months post-intervention) condom use was 13.1 percentage points higher among the UCT arm (compared to controls ($p < 0.05$). There were no significant differences in number of sexual partners or STI/HIV incidence compared to controls.	Med-high
Handa et al. (2014)	Kenya (7 districts)	2210 adolescents age 15–25	Cross-sectional data from cluster RCT participants, comparing adolescent sexual debut in households receiving the transfer and those in control households	Government of Kenya's Cash Transfer Program for OVC (KES 1500 or USD 20 per month per household) paid to OVC caregivers	The rate of sexual debut was 38% in the CT group vs. 44% in the control ($p = 0.001$); the reduction in odds of sexual debut for CT recipients was 31%. The effect size was larger for females (AOR = 0.58) than males (AOR = 0.74), but not significantly so. Other sexual risk behaviors measured were not statistically significantly different between the study arms.	Med-high
Baird et al. (2015)	Zomba, Malawi	Never married young women age 13–22 at enrollment (schoolgirls and dropouts)	Cluster RCT comparing CCT recipients, UCT recipients, and non-recipients to understand whether there are lasting effects of the CTs on a range of outcomes, including sexual behavior	CCT (based on at least 80% school attendance) or UCT of between USD 1–5/month to the girl and between USD 4–10/month for the guardian for 2 years	Two years after the program ended, among school girls neither CCTs nor UCTs had any long-term effect on the following sexual behaviors: sexual debut, age at first sex, number of sexual partners, condom use, and age of sexual partners. Among school dropouts, CCTs initially delayed the onset of sexual activity, but 2 years after the end of the program, 97% of this cohort is sexually active. CCTs did not lead to long-term changes in condom use, or age at first sex among baseline dropouts.	Medium
Cluver, Orkin, Meinck, Boyes, Yakubovich, et al. (2016)	Mpumalanga and Western Cape, South Africa	2668 adolescent boys and girls age 12–18	Prospective observational study with random sampling to test whether social protection is associated with indicators of five health-related Sustainable Development Goals (SDGs)	"Cash" was defined as receipt of a child-focused cash transfer, free schooling and books, and/or free school feeding. "Care" was defined as positive parenting, good parental monitoring, and/or teacher social support.	After 1 year, cash was significantly associated with reduced HIV risk behavior among boys (OR = 0.67, $p = 0.017$) and girls (OR = 0.64, $p = 0.008$). Additive but not interactive effects of "cash plus care" were seen in both boys and girls in relation to HIV risk behavior. Among girls only, cash was also associated with reduced sexual exploitation	Medium

(Continued)

Table 3. Continued.

Author & date	Location	Study population	Study design	Intervention	Main results	Quality ranking
					(OR = 0.67, $p = 0.03$) and reduced pregnancy (OR = 0.46, $p = 0.011$). Additive but not interactive effects were seen with “cash plus care” in odds of sexual exploitation among girls.	
DSD, SASSA, & UNICEF (2012)	South Africa (5 provinces)	15- to 17-year-olds benefiting from the Child Support Grant (CSG) and matched controls	Propensity score matched cross-sectional study to assess how the CSG affects key aspects of child and adolescent welfare	CSG is a government social protection scheme that provides a monthly cash grant of ZAR 280/USD 18 to child caregivers in poor households	Adolescents in households currently receiving the CSG were statistically significantly less likely (by 16 percentage points) to have ever had sex compared to those in households not currently receiving the grant. They were also significantly less likely to have multiple sex partners and females were less likely to have ever been pregnant.	Medium
Goodman et al. (2014)	Rural Kenya	707 OVC-headed households (aged 13 to 25)	Stratified-random, cross-sectional survey to assess differences among three program cohorts (those involved for 4 months, over 1 year, and over 2 years) in a range of outcomes, including sexual practices	3-year intervention grouping 20–40 families together for vocational training, group income-generating activities (IGAs), and provision of business start-up kits. They also received weekly group trainings on business, health, hygiene, and agriculture. Some families received cash transfers.	Among females, those in higher cohorts had fewer sex partners ($p = 0.03$) and greater condom use at last sexual encounter ($p = 0.015$). Among males there was no significant difference in number of sexual partners or condom use.	Medium
Rosenberg et al. (2014)	Kenya (4 locations from 7 districts)	684 sexually active adolescents age 15–25	Cross-sectional data from cluster RCT participants, examining adolescents’ sexual partner characteristics in households receiving the transfer compared to those in control households	Government of Kenya’s Cash Transfer Program for OVC (KES 1500 or USD 20 per month per household) paid to OVC caregivers	The study found no significant effect of the CT on transactional sex among either males (AOR = 1.57, $p = 0.36$) or females (AOR = 0.79, $p = 0.51$).	Medium
Siaplay (2012)	Cape Town, South Africa	4752 young adults age 14–22 at baseline	Analysis of existing longitudinal data to assess differences in several outcomes for young adults in Old Age Pension (OAP) recipient households compared to those in non-OAP households	OAP is a government social protection scheme that provides a monthly cash transfer of up to ZAR 1140/USD 75 targeted to poor women age 60+ and men age 65+	OAP receipt was associated with 16.8% reduction in sexual debut among females in the household ($p < 0.05$) and the effect was larger when the OAP recipient was also female (18.5%, $p < 0.01$). OAP was not associated with the number of sexual partners or condom use by either male or female young adults. OAP was associated with a 19.0% lower probability of marriage among young women and men ($p < 0.01$), and the effect is larger when the OAP recipient is female.	Low
Khoza et al. (2016)	Johannesburg, South Africa	41 adolescents age 16+	Qualitative data collection with a sub-sample of participants in a pilot RCT to explore the consequences of CTs on adolescents	Three CT intervention arms: 1) unconditional monthly payments, 2) monthly payments conditioned on school attendance, 3) single payment conditioned on a clinic visit	In interviews 6 months after the receipt of CTs and up to 12 months after the end of the intervention, some girls mentioned that CTs were protective against transactional sexual relationships.	Not Assessed

Table 4. Studies of conditional cash transfers on HIV prevention outcomes.

Author & date	Location	Study population	Study design	Intervention	Main results	Quality ranking
Baird et al. (2012)	Zomba, Malawi	1706 never married adolescent females age 13–22 (schoolgirls and school dropouts)	Cluster RCT comparing HIV prevalence and sexual risk behaviors between CCT recipients, UCT recipients, and non-recipients	CCT (based on at least 80% school attendance) and UCT recipients received from USD 1–5/month and their parents received from USD 4–10/month for 2 years	For schoolgirls, after 18 months HIV and HSV-2 prevalences were significantly lower in the UCT and CCT groups (HIV = 1.2%, HSV-2 = 0.7%) compared to controls (HIV = 3%, HSV-2 = 3%). No differences on these measures were seen between intervention and control for school dropouts, nor between the UCT and CCT arms. After 12 months, sexual intercourse at least once a week was significantly lower for the intervention group than controls, for both schoolgirls and dropouts. For schoolgirls only, having a sexual partner 25 or older was lower for intervention participants than controls.	High
de Walque et al. (2012)	Kilombero/ Ulanga, Tanzania	2399 males and females age 18–30, including adult spouses	RESPECT RCT to assess the effectiveness of CCTs on prevention of STIs	CCTs of USD 10 or USD 20 per testing round conditioned on testing negative for 4 curable STIs every 4 months (3 testing rounds in 12 months)	At 12 months, the high-value CCT arm had a lower risk of combined prevalence of any of the four STIs compared to controls (aRR = 0.73, $p < 0.05$), and compared to the low-value arm (aRR = 0.69, $p < 0.05$). At end line, the combination of syphilis prevalence and new cases of HIV and HSV2 were not different between study arms.	High
Pettifor et al. (2016)	Rural Mpumalanga, South Africa	2448 HIV negative females age 13–20, in high school	Individually randomized controlled trial to evaluate the efficacy of a CCT conditional on school attendance on HIV incidence compared to a control group	Young women and their parent/guardian received a monthly cash transfer of ZAR 100 (USD 10) and ZAR 200 (USD 20), respectively, conditional on 80% school attendance	After 3 years of implementation, there was no significant difference in HIV incidence or HSV-2 incidence between intervention and control participants. Those receiving the cash transfer were significantly less likely to report experiencing physical violence from a partner (RR = 0.66, $p < .001$), having a sex partner in the past 12 months (RR = 0.90, $p = 0.02$), or having unprotected sex in the past 3 months (RR = 0.81, $p = 0.05$). There was no significant difference between study arms for pregnancy, transactional sex, or older partners.	High
Yotebieng et al. (2016)	Kinshasa, Democratic Republic of the Congo	433 newly diagnosed HIV+ pregnant women	RCT to determine whether CCTs can increase the uptake of PMTCT services and retention in care	Cash payments starting at USD 5 and increasing by USD 1 at every visit, conditional on women attending scheduled clinic visits and completing associated actions such as providing a blood sample, delivering at a clinic, and accepting ART referrals	Intervention participants were more likely to be in care 6 weeks post-partum compared to controls (81% vs. 72%, $p = 0.055$). Intervention participants were also significantly more likely to have completed all PMTCT clinical visits and received all related services (68% vs. 54%, $p = 0.0037$).	High
Baird et al. (2010)	Zomba, Malawi	2692 never married girls age 13–22 (schoolgirls and dropouts)	Cluster RCT to assess the effects of the intervention on HIV risk behaviors	CCT (based on at least 75% school attendance) of USD 10/month for 10 months with an average of 30% going to the schoolgirl and	After 1 year, the intervention reduced the onset of sexual activity among schoolgirls by 31.3% ($p = 0.112$) and among dropouts by 46.6% (p	Med-high

(Continued)

Table 4. Continued.

Author & date	Location	Study population	Study design	Intervention	Main results	Quality ranking
				70% going to the guardian, plus direct payment of secondary school fees	= 0.01). Intervention schoolgirls were 20 percentage points less likely than controls to have sex on a weekly basis ($p < 0.1$), and 16 percentage points less likely to have an older sexual partner ($p < 0.1$), but there was no effect for dropouts. The number of lifetime sexual partners was 25% lower for the intervention participants, but only statistically significant for dropouts. CCTs had a significant impact on reducing early marriage (27.7% vs. 16.4%, $p < 0.01$) and pregnancy (16.2% vs. 11.1%, $p < 0.05$) among baseline dropouts, but there was no significant effect on schoolgirls. The intervention had no impact on condom use for either schoolgirls or dropouts.	
Galárraga et al. (2017)	Mexico City, Mexico	227 male sex workers age 18–40	RCT to assess the ability of economic incentives to motivate self-protection and health-care-seeking behaviors	Intervention arms 1 and 2 received food vouchers worth either USD 50 or USD 75, respectively, if they were free of new STIs at months 6 and 12. Intervention arm 3 received unconditional vouchers of USD 50 at months 6 and 12, regardless of STI status. All participants received prevention information/support.	Over an 18-month follow-up period (12 months intervention and 6 months post-intervention), condom use was higher among both the lower CCT (14.5 percentage points, $p < 0.05$) and higher CCT (11.7 percentage points, $p < 0.1$) arms compared to controls. There were no significant differences number of sexual partners or STI/HIV incidence compared to controls.	Med-high
Packel et al. (2012)	Kilombero/ Ulanga, Tanzania	1943 male and female participants age 18–30 (subset of the 2399 enrolled in RESPECT Trial)	RESPECT RCT exploring the effect of incentives on self-reported risk behavior	CCTs of USD 10 or USD 20 per testing round conditioned on testing negative for 4 curable STIs every 4 months (3 testing rounds in 12 months)	After 4 months (at the first testing round) participants in the low-value arm were 31% more likely to report sexual behavior change compared to controls ($p = 0.031$), but this was not the case for the high-value arm. Among women, those in the combined high- and low-value groups were more likely to report sexual behavior change compared to the control group ($p = 0.03$). Being in the high-value arm was associated with more unplanned behavior change ($p = 0.06$).	Med-high
Baird et al. (2015)	Zomba, Malawi	Never married young women age 13–22 at enrollment (schoolgirls and dropouts)	Cluster RCT comparing CCT recipients, UCT recipients, and non-recipients to understand whether there are lasting effects of the CTs on a range of outcomes, including sexual behavior	CCT (conditional on at least 80% school attendance) and UCT participants received from USD 1–5/month and their parents received from USD 4–10/month for 2 years	Two years after the program ended, among school girls neither CCTs nor UCTs had any long-term effect on the following sexual behaviors: sexual debut, age at first sex, number of sexual partners, condom use, and age of sexual partners. Among school dropouts, CCTs initially delayed the onset of sexual activity, but 2 years after the end of the program, 97% of this cohort is sexually active. CCTs did not lead to long-term changes in condom use, or age at first sex among baseline dropouts.	Medium

Galárraga and Gertler (2009)	Mexico	3743 urban adolescents age 12–24	Analysis of cross-sectional OPORTUNIDADES data on beneficiaries and non-beneficiaries to understand whether CCTs affected adolescent risk behaviors	OPORTUNIDADES included bimonthly transfers (household food stipend and educational scholarships), given to the female head of household, conditional on 85% child school attendance and receipt of preventive medical care or education	The intervention did not have a significant effect on adolescent sexual risk behaviors of sexual debut or condom use.	Medium
Kohler and Thornton (2012)	Rural Malawi	1307 men and women	RCT to assess the effects of two levels of CCTs on sexual risk behaviors	CCTs of K500 or K2000 (USD 4 or 16) for individuals or K2000 or K4000 (USD 16 or 32) for couples were given conditional on maintaining HIV status (positive or negative) throughout the intervention period	Over nearly 2 years, there was no significant difference in HIV status or reported sexual risk behaviors between those offered incentives and controls. Approximately 1 week after distribution, men who received incentives were 9% more likely to engage in sex ($p = 0.045$) and more likely to engage in riskier sex, but were also 5% more likely to use a condom ($p = 0.031$); women were 6.7% less likely to engage in sex compared to controls ($p = 0.038$).	Medium
de Walque et al. (2014)	Kilombero/ Ulanga, Tanzania	2399 males and females age 18–30, including adult spouses	RESPECT RCT to assess the effectiveness of CCTs on preventing STIs (4 directly linked to the transfer condition; HIV, HSV-2 and syphilis were also measured)	CCTs of USD 10 or 20 per testing round conditioned on testing negative for 4 curable STIs every 4 months (3 testing rounds in 12 months)	One year after the end of the intervention, both the high and low value CCTs lowered the risk of testing positive for any one of the 7 STIs (0.799 and 0.818, respectively, $p < 0.05$). Only the low-value arm significantly lowered the prevalence when looking only at the 4 STIs on which the CCT was conditioned (RR = 0.766, $p < 0.05$), and only the high-value arm significantly reduced the prevalence when looking at HIV/HSV/syphilis. Results were sustained 12 months post-intervention for males, but not females. There were no significant differences in self-reported sexual risk behavior at 24 months.	Low
Abdool Karim et al. (2015)	Rural KwaZulu-Natal, South Africa	3217 grade 9 and 10 students	Cluster RCT to evaluate the impact of a cash-incentivized prevention intervention to reduce HIV infection	Cash incentives of up to USD 175 over 2 years, conditional on their participation in a life skills program, passing grades in 6 months of academic exams and acceptance of an HIV test	After 2 years, CCTs reduced HSV-2 incidence by 30% ($p = 0.007$). Among boys, those in the incentive group had a 40% lower incidence of HSV-2 than controls ($p = 0.042$), while girls had a 24% lower incidence of HSV-2 compared to controls ($p = 0.035$). The reduction in HSV-2 infection was greater the higher the CCT amount. The number of HIV infections (75) was too small to detect a difference between intervention and control.	Not assessed
Khoza et al. (2016)	Johannesburg, South Africa	41 adolescents age 16+	Qualitative data collection with a sub-sample of participants in a pilot RCT to explore the consequences of CTs on adolescents	Three CT intervention arms: (1) unconditional monthly payments, (2) monthly payments conditioned on school attendance, (3) single payment conditioned on a clinic visit	In interviews 6 months after the receipt of CTs and up to 12 months after the end of the intervention, some girls mentioned that CTs were protective against transactional sexual relationships.	Not Assessed

Table 5. Studies of financial incentives on HIV prevention outcomes.

Author & date	Location	Study population	Study design	Intervention	Main results	Quality ranking
Thirumurthy et al. (2014)	Nyanza, Kenya	1502 uncircumcised men age 25–49	RCT to compare voluntary male medical circumcision (VMMC) uptake across 3 intervention groups and a control group	One-time food vouchers for either KES 200/USD 2.50, KES 700/USD 8.75, and KES 1200/USD 15 were provided to those who got VMMC within 2 months of enrollment	The USD 8.75 and USD 15.00 groups had significantly higher VMMC uptake within 2 months (6.6% and 9.0%, respectively) than the control group (1.6%, $p \leq 0.002$), but not the USD 2.50 group (1.9%). The effects of the USD 15 and USD 8.75 levels were not significantly different.	High
Thirumurthy et al. (2016)	Nyanza, Kenya	903 uncircumcised men age 21–39	RCT to compare VMMC uptake across 2 intervention groups (fixed compensation or lottery-based) and a control group	One intervention arm received a food voucher of KES 1000/USD 12.50, and the other was entered into a lottery with high-value prizes, both contingent on getting VMMC within 3 months of enrollment.	The fixed compensation group (USD 12.50) was significantly more likely to undergo VMMC within 3 months compared to controls (AOR = 7.1, $p = 0.005$). The lottery group had higher VMMC uptake compared to controls, but this was not statistically significant.	High
Nyqvist et al. (2015)	Lesotho (5 districts)	3029 males and females age 18–32	Individual RCT to examine the impact of a financial incentive lottery program on HIV incidence	Lottery incentive scheme (two prize levels: high prize of USD 100 and low prize of USD 50) held every 4 months for 2 years in which those who test negative for 2 curable STIs were eligible	Over 2 years, in the pooled intervention group, HIV incidence was 21.4% lower compared to the control ($p < .05$). In the high-prize arm only, HIV incidence was 28% lower compared to the control ($p < 0.05$); the low-prize arm was not significantly lower than the control. Effects of the intervention on HIV incidence were greater for women. The number of high-risk sexual acts were significantly reduced in the pooled intervention group compared to the control.	Med-high

Evens et al. (2016)	Nyanza, Kenya	45 male participants in RCT that assessed effectiveness of financial incentives on VMMC, plus 19 female partners.	Qualitative study to explore how financial incentives influenced the decision to get VMMC	One-time food vouchers for either KES 200/USD 2.50, KES 700/USD 8.75, and KES1200/USD 15 were provided to those who got VMMC within 2 months of enrollment	The incentives promoted VMMC uptake within 2 months by partially offsetting lost wages during and after the procedure. Participants who did not get circumcised perceived the compensation amounts to be insufficient or had nonfinancial barriers that were not addressed by the intervention. Female partners of circumcised participants felt that the intervention helped to motivate their partners to get circumcised.	Medium
Madhivanan et al. (2013)	Mysore, India	930 pregnant women aged 18+	Quasi-experimental study to compare the effectiveness of the Saving Children and Improving Lives (SCIL) intervention to the enhanced SCIL+ intervention in mobilizing use of HTS and antenatal care (ANC) services	SCIL integrated ANC and HTS services, including community education, and mobile ANC, HTS, and ART. SCIL+ added financial incentives to women's economic empowerment groups, giving USD 2 for identifying and accompanying pregnant women to ANC/HTS at the mobile clinic	Over the 1 year intervention, pregnant women in the SCIL+ villages were more likely to receive HTS (71.5%) compared to 41.9% in the SCIL villages ($p < 0.001$). SCIL+ was associated with improvements in ANC service provision from 43.3% in the SCIL villages to 72.5% the SCIL+ villages ($p < 0.001$).	Medium
Minnis et al. (2014)	San Francisco, CA (USA)	162 youth age 16–21 who identified as Latino/a	Cluster randomized 2-arm study to assess the feasibility of the Yo Puedo intervention and its effects on sexual risk behaviors	Yo Puedo focuses on life skills education, including sexual health promotion. Participants identify participation and performance goals tied to education, job training, and reproductive health for which payments of USD 5–30 were made upon completion.	Using an intention to treat analysis, after 6 months the intervention arm reported a lower odds of having sex in the past six months compared to controls (OR = 0.50, $p = 0.04$). There were positive trends for a lower odds of unprotected sex in the intervention arm, but this was not statistically significant.	Medium
Khan et al. (2012)	Islamabad, Pakistan	94 HIV+ married men in care whose spouses had never tested for HIV	Assessment of the effectiveness of a financial incentive program on spousal testing and status disclosure	Incentives of USD 5 for in-town clients and USD 14 for out-of-town clients to cover travel and accommodation costs to bring wives for HTS within 4 months	Disclosure of status to wives improved from 29% to 62% ($p < 0.05$), and condom use increased from 8% to 13% ($p < 0.08$).	Not assessed

Table 6. Studies of food assistance on HIV prevention outcomes.

Author & date	Location	Study population	Study design	Intervention	Main results	Quality ranking
Cluver et al. (2014)	Mpumalanga and Western Cape, South Africa	2668 adolescent boys and girls age 12–18	Prospective observational study of all households with an adolescent to assess the relationship between receipt of social services (“cash, ‘cash plus care,’ or “no support”) and HIV risk behaviors	“Cash” defined as household receipt of a Child Support Grant or Foster Care Grant, school feeding, and/or food gardens; “cash plus care” adds receipt of teacher social support and/or positive parenting	At 1 year follow up, for girls, cash alone was associated with a reduction in the incidence of combined HIV-risk behaviors (OR = 0.63, $p = 0.02$); cash plus care was more effective (OR = 0.55; $p = 0.007$). At follow up, incidence of HIV-risk behavior was 41.2% for girls with no support, 24.5% with cash support, and 15.4% with cash plus care. For boys, cash alone was not associated with lower HIV risk behaviors, but cash plus care was (OR = 0.50, $p = 0.005$). At follow up, incidence of HIV risk behavior was 42.1% for boys with no support and 17.0% for boys with cash plus care.	High
Cluver, Orkin, Meinck, Boyes, and Sherr (2016)	Mpumalanga and Western Cape, South Africa	2668 adolescent boys and girls age 12–18	Prospective observational study with random sampling to examine the potential pathways from structural disadvantage to adolescent HIV risks, and the effect of cash and care types of social protection on adolescent HIV risk pathways	Types of social protection assessed included cash or cash-in-kind (receipt of a child-focused cash transfer, free schooling and books, free school feeding daily, and/or food gardens), and “care” (positive parenting, good parental monitoring, and/or teacher social support)	At 1 year follow up, for both girls and boys, cash or cash-in-kind moderated the pathway from structural drivers to psychosocial problems (i.e., abuse, behavior problems, school dropout, and mental health distress), and from psychosocial problems to HIV risk ($p < 0.001$). Social protection was most effective for adolescents for whom structural and psychosocial drivers place them at highest risk for HIV.	High
Cluver, Orkin, Yakubovich, and Sherr (2016)	Mpumalanga and Western Cape, South Africa	2668 adolescent boys and girls age 12–18	Prospective observational study of all households with an adolescent to assess the relationship between receipt of social services and HIV risk behaviors	Receipt of any of 14 social protection services, including child-focused cash transfers, household pensions, free schooling, school supplies, school feeding, food gardens, food aid, parental support and monitoring, and teacher support	At 1 year follow up, incautious sex was significantly lower for girls in school feeding programs (AOR = 0.64, $p = 0.02$), as was likelihood of pregnancy (AOR = 0.32, $p = 0.003$). Greater reductions in these HIV risk behaviors were seen when school feeding was combined with parental monitoring. There were no effects of this support for boys.	Med-high

Cluver, Orkin, Meinck, Boyes, Yakubovich, et al. (2016)	Mpumalanga and Western Cape, South Africa	2668 adolescent boys and girls age 12–18	Prospective observational study with random sampling to test whether social protection is associated with indicators of five health-related Sustainable Development Goals (SDGs)	“Cash” was defined as receipt of a child-focused cash transfer, free schooling and books, and/or free school feeding. “Care” was defined as positive parenting, good parental monitoring, and/or teacher social support.	After 1 year, cash was significantly associated with reduced HIV risk behavior among boys (OR = 0.67, $p = 0.017$) and girls (OR = 0.64, $p = 0.008$). Additive but not interactive effects of “cash plus care” were seen in both boys and girls in relation to HIV risk behavior. Among girls only, cash was also associated with reduced sexual exploitation (OR = 0.67, $p = 0.03$) and reduced pregnancy (OR = 0.46, $p = 0.011$). Additive but not interactive effects were seen with “cash plus care” in odds of sexual exploitation among girls.	Medium
Galárraga and Gertler (2009)	Mexico	3743 urban adolescents age 12–24	Analysis of cross-sectional OPORTUNIDADES data on beneficiaries and non-beneficiaries to understand whether CCTs affected adolescent risk behaviors	OPORTUNIDADES included bimonthly transfers (household food stipend and educational scholarships), given to the female head of household, conditional on 85% child school attendance and receipt of preventive medical care or education.	The intervention did not have a significant effect on adolescent sexual risk behaviors of sexual debut or condom use.	Medium
Toska et al. (2016)	Eastern Cape, South Africa	1059 10- to 19-year-olds ever initiated on ART	Cross-sectional study to assess whether various forms of social protection are associated with lower rates of unprotected sex	Several social protection services/supports were assessed, including food security and free school access and materials, among other non-HES “care” factors.	Receipt of food security assistance was not a significant predictor of safer sex in this population.	Medium
Visser et al. (2015)	South Africa (KZN, Eastern Cape, Mpumalanga, Gauteng)	604 former OVC age 18–25	Post-intervention study investigating differences in HIV risk behavior and other outcomes between former ISIBINDI participants and a control group	The core of the ISIBINDI model is home visits to promote OVC wellbeing, and includes optional components of career guidance, job empowerment, food gardens, and IGAs	12.9% of ex-participants of ISIBINDI reported HIV risk behavior compared to 19.7% of controls ($p = 0.012$). The percentage of participants that received food aid was not reported.	Medium

Table 7. Studies of educational support on HIV prevention outcomes.

Author & date	Location	Study population	Study design	Intervention	Main results	Quality ranking
Cluver, Orkin, Meinck, Boyes, and Sherr (2016)	Mpumalanga and Western Cape, South Africa	2668 adolescent boys and girls age 12–18	Prospective observational study with random sampling to examine the potential pathways from structural disadvantage to adolescent HIV risks, and the effect of cash and care types of social protection on adolescent HIV risk pathways	Types of social protection assessed included cash or cash-in-kind (receipt of a child-focused cash transfer, free schooling and books, free school feeding daily, and/or food gardens), and “care” (positive parenting, good parental monitoring, and/or teacher social support)	After 1 year, for both girls and boys, cash or cash-in-kind moderated the pathway from structural drivers to psychosocial problems (i.e., abuse, behavior problems, school dropout, and mental health distress), and from psychosocial problems to HIV risk ($p < 0.001$). Social protection was most effective for adolescents for whom structural and psychosocial drivers place them at highest risk for HIV.	High
Hallfors et al. (2011)	Manicaland, Zimbabwe	329 orphan girls in grade 6 at baseline	Cluster RCT to assess the effects of the intervention on HIV risk behaviors	Payment of school fees, uniforms, supplies, and a school-based female teacher to serve as a helper to assist with attendance monitoring and assist with attendance problems	After 2 years, participants in the intervention were 63% less likely to be married than the controls ($p < 0.05$). The variable of sexual debut was too inconsistently reported to be analyzed.	High
Baird et al. (2010)	Zomba, Malawi	2692 never married girls age 13–22 (schoolgirls and dropouts)	Cluster RCT to assess the effects of the intervention on HIV risk behaviors	CCT (based on at least 75% school attendance) of USD 10/month for 10 months with an average of 30% going to the schoolgirl and 70% going to the guardian, plus direct payment of secondary school fees	After 1 year, the intervention reduced the onset of sexual activity among schoolgirls by 31.3% ($p = 0.112$) and among dropouts by 46.6% ($p = 0.01$). Intervention schoolgirls were 20 percentage points less likely than controls to have sex on a weekly basis ($p < 0.1$), and 16 percentage points less likely to have an older sexual partner ($p < 0.1$), but there was no effect for dropouts. The number of lifetime sexual partners was 25% lower for the intervention participants, but only statistically significant for dropouts. CCTs had a significant impact on reducing early marriage (27.7% vs. 16.4%, $p < 0.01$) and pregnancy (16.2% vs. 11.1%, $p < 0.05$) among baseline dropouts, but there was no significant effect on schoolgirls. The intervention had no impact on condom use for either schoolgirls or dropouts.	Med-high
Cho et al. (2017)	Nyanza Province, Kenya	835 orphan adolescents	Cluster RCT to test whether keeping orphan adolescents in school reduces HIV risk	The intervention arm received payment of school fees, school uniforms, and nurse’s visits to monitor absenteeism.	After 3 years, school support reduced the likelihood of engaging in transactional sex (AOR = 0.49, $p = 0.03$), and increased VMMC among males (AOR = 1.66, $p = 0.04$), but no differences were seen in sexual debut, age at first sex, number of sexual partners, or condom use between intervention and control participants. The study was underpowered to detect a difference on HIV or HSV-2 incidence between arms.	Med-High

Cluver, Orkin, Yakubovich, and Sherr (2016)	Mpumalanga and Western Cape, South Africa	2668 adolescent boys and girls age 12–18	Prospective observational study of all households with an adolescent to assess the relationship between receipt of social services and HIV risk behaviors	Receipt of any of 14 social protection services for at least 1 year, including child-focused cash transfers, household pensions, free schooling, school supplies, school feeding, food gardens, food aid, parental support and monitoring, and teacher support	At 1 year follow up, economically motivated sex was significantly lower among girls getting free school and books (AOR = 0.36, $p < 0.0001$). Reductions were greater when combined with parental monitoring and receipt of a child grant. For boys, free schooling and books were independently associated with a reduction in incautious sex (AOR = 0.69, $p < 0.046$). Greater reductions were found when combined with parental monitoring and teacher support.	Med-high
Hallfors et al. (2015)	Manicaland, Zimbabwe	328 orphan girls in grade 6 at baseline	Cluster RCT to assess the effects of the intervention on HIV risk behaviors and HIV prevalence	The intervention arm received payment of school fees, uniforms, supplies, and a school-based female teacher to serve as a helper for 5 years. The control group received school fees only for the last 1.5 years of the study (partial intervention)	Sexual debut was statistically significantly lower in the full intervention group (14.3%) compared to the partial intervention group (23.8%, $p = 0.04$). Full intervention participants also had significantly lower rates of marriage (11.2% vs. 23.6%, $p = 0.01$) and pregnancy (11.8% vs. 22.2%, $p = 0.02$) compared to partial intervention girls. There was no significant difference in prevalence of HIV or HSV-2 at end line.	Med-high
Cluver, Orkin, Meinck, Boyes, Yakubovich, et al. (2016)	Mpumalanga and Western Cape, South Africa	2668 adolescent boys and girls age 12–18	Prospective observational study with random sampling to test whether social protection is associated with indicators of five health-related Sustainable Development Goals (SDGs)	“Cash” was defined as receipt of a child-focused cash transfer, free schooling and books, and/or free school feeding. “Care” was defined as positive parenting, good parental monitoring, and/or teacher social support.	After 1 year, cash was significantly associated with reduced HIV risk behavior among boys (OR = 0.67, $p = 0.017$) and girls (OR = 0.64, $p = 0.008$). Additive but not interactive effects of “cash plus care” were seen in both boys and girls in relation to HIV risk behavior. Among girls only, cash was also associated with reduced sexual exploitation (OR = 0.67, $p = 0.03$) and reduced pregnancy (OR = 0.46, $p = 0.011$). Additive but not interactive effects were seen with “cash plus care” in odds of sexual exploitation among girls.	Medium

(Continued)

Table 7. Continued.

Author & date	Location	Study population	Study design	Intervention	Main results	Quality ranking
Hallfors, Cho, Mbai, Milimo, and Itindi (2012)	Rural western Kenya	105 orphans age 11–14 at baseline	Pilot cluster RCT to examine intervention implementation and associations with HIV risk factors	School uniforms, payment of school fees (when needed), sanitary pads/underwear, and monitoring assistance from a community visitor; intervention and control households got two monthly food rations	After 1 year, participants in the intervention arm were 42% less likely to have had their sexual debut ($p = 0.07$), but the effect disappeared after two years. The intervention had no significant effect on early marriage or pregnancy.	Medium
Luseno et al. (2015)	Rural Zimbabwe	751 adolescents (287 rural female orphans from an RCT and 464 rural female orphans and non-orphans from DHS)	Comparison of orphans included in an RCT and adolescents included in the DHS survey to examine whether providing school support reduces HIV risk behaviors and odds of HIV infection. Four comparison groups: RCT full intervention, RCT partial intervention, DHS orphans, and DHS non-orphans	RCT intervention participants received school fees, uniforms, and school supplies for 5 years, while RCT controls (partial intervention) received school fees only for last 1.5 years of study.	RCT participants had a significantly lower odds of sexual debut (AOR = 0.23 for full intervention, $p < 0.001$; AOR = 0.41 for partial intervention, $p < 0.01$) and early marriage (AOR = 0.17 for full intervention, $p < 0.001$; AOR = 0.41 for partial intervention, $p < 0.01$) compared to DHS orphans, but not non-orphans. Full intervention participants had a lower odds of pregnancy than DHS orphans (AOR = 0.26, $p < 0.001$), but not non-orphans. HIV infection was not significantly different between RCT participants and DHS orphans, but was statistically significantly higher in RCT participants compared to non-orphans (likely due to vertical transmission).	Medium
Toska et al. (2016)	Eastern Cape, South Africa	1059 10- to 19-year-olds ever initiated on ART	Cross-sectional study to assess whether various forms of social protection are associated with lower rates of unprotected sex	Several social protection services/supports were assessed, including food security and free school access and materials, among other non-HES “care” factors.	Support with access to school was significantly associated with lower levels of unprotected sex (OR = 0.51, $p < 0.005$). The association was greater when combined with adolescent-friendly sexual health care at clinics and good parental supervision.	Medium

Table 8. Studies of savings on HIV prevention outcomes.

Author & date	Location	Study population	Study design	Intervention	Main results	Quality ranking
<i>Individual savings</i>						
Witte et al. (2015)	Ulaanbaatar, Mongolia	107 females age 18 + involved in street-based sex work	Group RCT to assess outcomes from a sexual risk reduction intervention compared to the same intervention plus economic strengthening	4-session HIV sexual risk reduction (HIVSRR) alone, or HIVSRR plus an economic strengthening component composed of financial literacy and business development training, small group business mentorship, and 2 : 1 matched savings accounts (match of up to USD 160 over 4 months)	At 6-month follow up, both groups exhibited a decrease in the number of paying sexual partners, though the reduction in the combined intervention group was 22% greater ($p < 0.001$). Similarly, both groups had reductions in the number of unprotected vaginal sex acts with paying partners, and participants in the combined intervention were 3.72 times more likely to report no unprotected sex with paying partners in the past 90 days ($p < 0.05$).	High
Austrian and Muthengi (2014)	Kampala, Uganda	1062 adolescent girls age 10–19	Quasi-experimental pilot evaluation comparing HTS and sexual harassment outcomes between two intervention arms and a control arm	“Savings Only” (individual savings accounts) or “Savings Plus,” which also included financial education, weekly safe spaces/meeting, and reproductive health training	After 1 year, Savings Only girls were significantly more likely than comparison girls to report indecent touching (OR = 3.146, $p < 0.01$), and the proportion in this arm who experienced indecent touching increased during the study period from 9% to 15% ($p < 0.05$). No significant differences or changes were observed in indecent touching for Savings Plus arm.	Med-high
<i>Group savings</i>						
Erulkar and Chong (2005)	Nairobi, Kenya	444 out-of-school adolescent females age 16–22	Longitudinal (pre-post intervention) study of Tap and Reposition Youth (TRY) participants and matched controls to assess changes in vulnerabilities and risk behaviors	The TRY intervention combined training on business management and reproductive health, group savings, and formal microcredit to individual group members contingent on other members’ timely repayment	At program exit (after < 1 year to 3 years), 80.3% of TRY participants were able to refuse sex with their partner, compared to 71.6% of controls ($p < 0.05$), though in both arms this was a decrease from baseline. TRY girls were significantly more likely to insist on condom use compared to controls (61.7% vs. 49.3%, $p < 0.01$). There was no significant difference in the likelihood of having used a condom at last sex between the two groups, though both arms experienced a decrease from baseline levels.	High

(Continued)

Table 8. Continued.

Author & date	Location	Study population	Study design	Intervention	Main results	Quality ranking
Pillai et al. (2012)	3 districts in Karnataka, India	1556 FSW (surveys); 307 FSW focus group discussions (FGDs)	Observational study using cross-sectional surveys and FGDs to explore safe sex behaviors, comparing FSW who were group members with non-members	"Members" were part of an FSW collective providing support that varied between sites, but included social support, condom promotion, and health talks/education. Two of the sites (Bellary and Bangalore Urban) also had savings activities, while Shigoma did not.	After 28–37 months, members were significantly more likely to use a condom with their last client compared to non-members in Bellary (OR = 7.54, $p < 0.05$) and Bangalore Urban (OR = 3.00, $p < 0.05$). However, outcomes for other condom use behaviors were mixed. In Shigoma, members did not have access to group/cooperative lending and no association was found between group membership and condom use. FGDs revealed that in Bellary and Bangalore Urban, group savings and credit reduced dependence on exploitative loans and allowed them to refuse unsafe sex.	Medium
Swendeman et al. (2009)	West Bengal, India	216 FSW	Quasi-experimental study to evaluate the Sonagachi empowerment intervention's effect on HIV/STI prevention, compared to STI treatment, peer education and condom promotion alone	The Sonagachi intervention includes STI treatment, health education, condom promotion, rights-based advocacy, community organizing, and group savings and lending.	After 16 months, intervention participants were more likely to report being the most important condom negotiation decision maker (OR = 24.7, $p < 0.001$), and more likely to report having ever refused a client for refusing to use a condom (OR = 6.2, $p < 0.001$) compared to those only getting clinical prevention services and health education.	Medium
Mantsios et al. (2016)	Iringa, Tanzania	254 FSW	Longitudinal data from an ongoing RCT analyzed to assess the association between community savings group membership and HIV protective behaviors	Community savings groups	Participating in a community savings group was significantly associated with refusal of unsafe sex (AOR = 2.94, $p < 0.05$) and lower odds of reporting an STI in the last 6 months (AOR = 0.37, $p < 0.05$). Community savings participation was marginally significantly associated with always using a condom with new clients (AOR = 2.06)	Not Assessed

Table 9. Studies of financial education and training on HIV prevention outcomes.

Author & date	Location	Study population	Study design	Intervention	Main results	Quality ranking
Witte et al. (2015)	Ulaanbaatar, Mongolia	107 females age 18+ involved in street-based sex work	Group RCT to assess sexual risk outcomes from a sexual risk reduction intervention compared to the same intervention plus economic strengthening	4-session HIV sexual risk reduction (HIVSRR) alone, or HIVSRR plus an economic strengthening component composed of financial literacy and business development training, small group business mentorship, and 2 : 1 matched savings accounts (match of up to USD 160 over 4 months)	At 6-month follow up, both groups exhibited a decrease in the number of paying sexual partners, though the reduction in the combined intervention group was 22% greater ($p < 0.001$). Similarly, both groups had reductions in the number of unprotected vaginal sex acts with paying partners, and participants in the combined intervention were 3.72 times more likely to report no unprotected sex with paying partners in the past 90 days ($p < 0.05$).	High
Dunbar et al. (2014)	Chitungwiza, Zimbabwe	315 HIV- female, out of school orphans age 16–19	Individual RCT to compare the effects of the Shaping the Health of Adolescents in Zimbabwe (SHAZ!) intervention on structural factors and sexual risk behaviors	SHAZ! Intervention consisted of: 1) reproductive health services, 2) life skills, gender, and HIV education, 3) financial literacy education and a choice of 6-month vocational training course, and 4) integrated social support and adult mentoring. The control arm received components 1 and 2 only.	After 2 years, within the intervention arm, there were statistically significant reductions in transactional sex (IOR = 0.64, $p < 0.05$), and increases in condom use with current partners (IOR = 1.79, $p < 0.05$) compared to baseline, but these were not significantly different from the results in the control group. Sexual debut also did not differ between arms. Unintended pregnancy was marginally significantly lower in intervention arm (AHR = 0.61, $p = 0.06$). Intervention participants also had a greater reduction in the experience of violence over time (AHR = 0.10, $p = 0.06$). The study was not powered to detect differences in HIV and HSV-2 incidence.	Med-high
Hallman and Roca (2011)	KwaZulu-Natal, South Africa	Adolescents in grades 10 and 11 at the start of the intervention	Cluster randomized program evaluation testing the relative effectiveness of two versions of the Siyakha Nentsha intervention against the standard life skills curriculum	1-hour sessions 2–3 times/week focused on building adolescents' health and social capabilities. This was compared to an enhanced version that also included sessions on financial capabilities.	After 18 months, intervention boys (both regular and enhanced) were more likely to have remained sexually abstinent compared to the control group, and those who did have sex reported having fewer sexual partners than boys in the control group. Neither magnitudes of effect or significance levels were reported. These outcomes were not reported for girls.	Low

Table 10. Studies of income generation on HIV prevention outcomes.

Author & date	Location	Study population	Study design	Intervention	Main results	Quality ranking
Sherman et al. (2006)	Baltimore, Maryland (USA)	50 drug-using women involved in sex work	Pre- and post-intervention surveys to assess whether participation in the intervention changed HIV risk behaviors	Six 2-hour sessions teaching HIV risk reduction and the making, marketing, and selling of jewelry	Three months post-intervention, there were significant reductions in the proportion receiving drugs or money for sex (100% to 71%, $p < 0.001$). There were also reductions in the median number of sex trade partners per month (from 9 to 3, $p = 0.02$). Receiving income from jewelry sales was statistically significantly associated with a lower number of monthly sex partners ($p = 0.013$). There were also significant reductions in daily drug use and the amount of money spent on drugs.	Med-high
Zakaras et al. (2016)	Nyanza Region, Kenya	54 PLHIV age 18–49 in ART care who participated in the Shamba Maisha RCT	Longitudinal qualitative study using in-depth interviews to understand the impact of the Shamba Maisha intervention on gendered power and sexual risk behaviors	After a down payment of KES 500/USD 6, loans of USD 150 were given to purchase farming equipment and a water pump. The intervention arm also received agricultural and financial management training sessions	After 1 year of implementation, most female and male intervention participants reported increased condom use. Many male participants reported reducing extramarital sexual partners, and some female participants said they were better able to refuse sex after participating in the intervention and/or better able to negotiate condom use.	Med-high
Gnauck et al. (2013)	Southeastern Kenya	60 women (n = 39 cooperative members and n = 21 non-coop members)	Qualitative observational study to understand how engagement in an economic intervention is related to experiences of HIV risk and AIDS-related stigma	Basket weaving cooperative	The intervention was not protective of HIV risks, as described by one coop woman: "You can take care of yourself but then your husband is not faithful ... He brings the AIDS to you." Although non-coop women expressed more domestic violence, both groups discussed this risk.	Medium
Goodman et al. (2014)	Rural Kenya	707 OVC headed households (age 13 to 25)	Stratified random, cross-sectional survey to assess differences among three program cohorts (those involved for 4 months, over 1 year, and over 2 years) in a range of outcomes, including sexual practices	3-year intervention grouping 20–40 families together for vocational training, group IGAs, and provision of business start-up kits. They also received weekly group trainings on business, health, hygiene, and agriculture. Some families received cash transfers	Among females, those that had been in the program for at least a year had fewer sex partners ($p = 0.03$) and greater condom use at last sexual encounter ($p = 0.015$). Among males there was no significant difference in number of sexual partners or condom use.	Medium
Visser et al. (2015)	South Africa (KZN, Eastern Cape, Mpumalanga, Gauteng)	604 former OVC age 18–25	Post-intervention study investigating differences in HIV risk behavior and other outcomes between former ISIBINDI participants and a control group	The core of the ISIBINDI model is home visits to promote OVC wellbeing, and includes optional components of career guidance, job empowerment, food gardens, and IGAs.	12.9% of ex-participants of ISIBINDI reported HIV risk behavior compared to 19.7% of controls ($p = 0.012$). The percentage of participants that received IGAs was not reported.	Medium
Bazika (2007)	Ewo, Republic of Congo	372 young people age 15–24	Cross-sectional survey and FGDs to understand how involvement in IGAs is associated with HIV risk	IGAs consisting mostly of "trade and craft apprenticeships"	Approximately 25% of the youth were involved in IGAs; 5% of all participants reported sexual intercourse with a new partner without a condom, which was significantly lower among those currently involved in IGAs ($p < 0.01$), however higher levels of unprotected sex were reported by youth involved in agriculture.	Not assessed

Table 11. Studies of microcredit on HIV prevention outcomes.

Author & date	Location	Study population	Study design	Intervention	Main results	Quality ranking
Erulkar and Chong (2005)	Nairobi, Kenya	444 out-of-school adolescent females age 16–22	Longitudinal (pre-post intervention) study of Tap and Reposition Youth (TRY) participants and matched controls to assess changes in vulnerabilities and risk behaviors	The TRY intervention combined training on business management and reproductive health, group savings, and formal microcredit to individual group members contingent on other members' timely repayment.	At program exit (after < 1 year to 3 years), 80.3% of TRY participants were able to refuse sex with their partner, compared to 71.6% of controls ($p < 0.05$), though in both arms this was a decrease from baseline. TRY girls were significantly more likely to insist on condom use compared to controls (61.7% vs. 49.3%, $p < 0.01$). There was no significant difference in the likelihood of having used a condom at last sex between the 2 groups, though both arms experienced a decrease from baseline levels.	High
Pronyk et al. (2006)	Limpopo Province, South Africa	860 pair matched women; 1835 people age 14–35 living with those women; and 3881 people age 14–35 living in intervention and control villages	Village-randomized, controlled trial to assess the effect of the Intervention with Microfinance for AIDS and Gender Equity (IMAGE) on 1) participants' experience of IPV, 2) unprotected sex by young people living in the households and villages of participants, and 3) and HIV incidence among young people in intervention villages	IMAGE included group microcredit (5 women per group) and 12–15 months of gender and HIV training plus community mobilization.	After 2 years, participants experienced significantly less IPV in the previous 12 months compared to controls (RR = 0.45, $p < 0.05$). The intervention had no effect on the rate of unprotected sexual intercourse at last occurrence with a non-spousal partner for young people in the households of participants, or for young people living in participant villages. There was also no difference in HIV incidence among young people in intervention and comparison villages.	High
Rosenberg et al. (2011)	Limbe, Haiti	192 female Fonkoze clients age 18–49	Cross-sectional surveys to compare HIV risk behavior between those involved in microcredit for less than 12 months with those involved for more than 12 months	Microcredit to solidarity groups of 5 women, with loans starting at USD 75	There was no significant difference between the two groups in condom use over the last year. Among women who reported partner infidelity, those involved in microcredit for more than 12 months were 3.95 times more likely to use a condom with an unfaithful partner than those involved in microcredit for less than 12 months ($p = 0.063$).	Med-high
Zakaras et al. (2016)	Nyanza Region, Kenya	54 PLHIV aged 18–49 in ART care who participated in the Shamba Maisha RCT	Longitudinal qualitative study using in-depth interviews to understand the impact of the Shamba Maisha intervention on gendered power and sexual risk behaviors	After a down payment of KES 500/USD 6, loans of USD 150 were given to purchase farming equipment and a water pump. The intervention arm also received agricultural and financial management training sessions.	After 1 year of implementation, most female and male intervention participants reported increased condom use. Many male participants reported reducing extramarital sexual partners, and some female participants said they were better able to refuse sex after participating in the intervention and/or better able to negotiate condom use.	Med-high
Kim et al. (2009)	Limpopo Province, South Africa	1409 female participants	Cross-sectional study of randomly selected matched clusters to compare associations between IPV, sexual risk behaviors, economic well-being, and empowerment between three clusters: villages exposed to	(1) IMAGE included group microcredit (5 women per group) and 12–15 months of gender and HIV training plus community mobilization (2) group microcredit only using the same approach as IMAGE.	After 2 years, the IMAGE intervention showed significant reductions in IPV [aRR = 0.51, 95% CI (0.28–0.93)] and positive trends for increased condom use (RR = 1.89) compared to the control group. The microcredit-only arm showed trends of reduced IPV (aRR = 0.86)	Medium

(Continued)

Table 11. Continued.

Author & date	Location	Study population	Study design	Intervention	Main results	Quality ranking
			IMAGE, villages exposed to microcredit only, and control villages		and increased in condom use (aRR = 1.17) compared to controls, but these were not statistically significant. The IMAGE intervention and the microcredit-only arm were not statistically different on these outcomes.	
MacPherson et al. (2015)	Mangochi District, Malawi	Men and women working in the fishing industry and borrowing from microcredit organizations	Observational qualitative study to explore female fish traders' experience with microcredit within a high HIV context	Group microcredit with borrowing in groups of 10–20 women	The unpredictability of the fishing industry, short repayment times, and threats of property confiscation increased some female fish traders' vulnerability to HIV.	Medium
Odek et al. (2009)	Nairobi, Kenya	227 adult female sex workers	Pre- and post-intervention study without control to assess the effects of adding microenterprise to an existing HIV intervention on sexual risk behaviors	Group microcredit, business skills training, and savings promotion were added to an existing program of peer-mediated STI/HIV prevention and care education and condom promotion.	After 2 years, the mean number of sex partners in the preceding week changed from 3.26 to 1.84 ($p < 0.001$). Condom use with casual sex partners remained high at both survey points (93.8% to 95.4%) while consistent condom use with regular partners increased from 78.9% at baseline to 93.5% at end line ($p = 0.03$). In addition, 45.4% of participants reported stopping sex work.	Medium
Pronyk et al. (2008)	Limpopo Province, South Africa	220 pair matched women age 14–35 at baseline	Secondary analysis of IMAGE study data to assess the effects of the intervention on young female participants' HIV risk behavior	IMAGE included group microcredit (5 women per group) and 12–15 months of gender and HIV training plus community mobilization.	After 2 years, intervention women age 14–35 were less likely to have had unprotected sex at last intercourse with a non-spousal partner (RR = 0.76, $p < 0.05$). The intervention did not have an effect on the likelihood of having more than one sexual partner.	Medium
Dunbar et al. (2010)	Chitungwiza and Epworth, Zimbabwe	50 adolescent, female, out-of-school orphans	Pre- and post-intervention surveys to assess the feasibility of the intervention	Shaping the Health of Adolescents in Zimbabwe (SHAZI) pilot, which combined life skills education for HIV prevention, business training and mentoring, and access to microcredit	At 6 months, participants reported no significant change in condom use from baseline to end line. Increased exposure to physical harm, sexual abuse, and coercion was noted in the qualitative interviews and supported by the following quote: "In the bus compound I always encountered men who wanted to have a relationship with me. I would tell them I was married or that I wasn't interested, but it wouldn't stop them." The study was unable to compare baseline and end line data for sexual violence and forced sex.	Low
Souverein et al. (2013)	Bangalore, India	17,092 FSW	Prospective observational study to assess whether exposure to the Pragati empowerment program was associated with changes in STI incidence and condom use.	The Pragati empowerment approach is composed of community outreach, crisis response, condom promotion, STI prevention and treatment, savings and lending through an MFI, alcohol de-addiction, and access to facilities for bathing and resting.	Over 4 years (average follow up was 1.48 years), the number of STIs per person-year of program exposure decreased significantly from 69% in year 1 to 47% in year 3, but increased to 63% by year 4 ($p < 0.001$ for four-year trend). The proportion of FSW with one or more STI per person-year decreased from 37% in year 1 to 4% in year 4 ($p < 0.001$). The proportion of participants who reported using a condom at last paid sex increased from 77.6% in year 1 to 100% in year 4 ($p < 0.001$).	Low

Table 12. Studies of vocational and entrepreneurial training on HIV prevention outcomes.

Author & date	Location	Study population	Study design	Intervention	Main results	Quality ranking
Erulkar and Chong (2005)	Nairobi, Kenya	444 out-of-school adolescent females age 16–22	Longitudinal (pre-post intervention) study of Tap and Reposition Youth (TRY) participants and matched controls to assess changes in vulnerabilities and risk behaviors	The TRY intervention combines training on business management and reproductive health, group savings, and formal microcredit to individual group members contingent on other members' timely repayment.	At program exit (after < 1 year to 3 years), 80.3% of TRY girls were able to refuse sex with their partner, compared to 71.6% of controls ($p < 0.05$), though in both arms this was a decrease from baseline. TRY girls were significantly more likely to insist on condom use compared to controls (61.7% vs. 49.3%, $p < 0.01$). There was no significant difference in the likelihood of having used a condom at last sex between the two groups, though both arms experienced a decrease from baseline levels.	High
Witte et al. (2015)	Ulaanbaatar, Mongolia	107 females age 18 + involved in street-based sex work	Group RCT to assess sexual risk outcomes from a sexual risk reduction intervention compared to the same intervention plus economic strengthening	4-session HIV sexual risk reduction (HIVSRR) alone, or HIVSRR plus an economic strengthening component composed of financial literacy and business development training, small group business mentorship, and 2 : 1 matched savings accounts (match of up to USD 160 over 4 months)	At 6-month follow up, both groups exhibited a decrease in the number of paying sexual partners, though the reduction in the combined intervention group was 22% greater ($p < 0.001$). Similarly, both groups had reductions in the number of unprotected vaginal sex acts with paying partners, and participants in the combined intervention were 3.72 times more likely to report no unprotected sex with paying partners in the past 90 days.	High
Dunbar et al. (2014)	Chitungwiza, Zimbabwe	315 female, out-of-school orphans age 16–19	Individual RCT to compare the effects of the Shaping the Health of Adolescents in Zimbabwe (SHAZI) intervention on structural factors and sexual risk behaviors	SHAZI Intervention consisted of: 1) reproductive health services, 2) life skills, gender, and HIV education, 3) financial literacy education and a choice of 6-month vocational training course, and 4) integrated social support and adult mentoring. The control arm received components 1 and 2 only.	After 2 years, within the intervention arm, there were statistically significant reductions in transactional sex (IOR = 0.64, $p < 0.05$), and increases in condom use with current partners (IOR = 1.79, $p < 0.05$) compared to baseline, but these were not significantly different from the results in the control group. Sexual debut also did not differ between arms. Unintended pregnancy was marginally significantly lower in intervention arm (AHR = 0.61, $p = 0.06$). Intervention participants also had a greater reduction in the experience of violence over time (AHR = 0.10, $p = 0.06$). The study was not powered to detect differences in HIV and HSV-2 incidence.	Med-high
Sherman et al. (2010)	Chennai, India	100 FSW age 18+	Block RCT to assess the feasibility of the intervention and measure associations with sexual risk behaviors	100 hours of training in tailoring canvas bags. Both intervention and control arms received 8 hours of HIV prevention education.	At 6-month follow-up, intervention participants reported a significantly lower average number sex partners (5) compared to controls (11.9, $p < 0.001$) and a lower number of paying customers (3.1) compared to controls (5.1, $p < 0.001$). There was no significant difference between arms in condom use at last sex.	Med-high
Adoho et al. (2014)	Monrovia, Liberia	2106 females age 16–27 not enrolled in school	RCT comparing economic, empowerment, and health outcomes between participants and controls	Economic Empowerment of Adolescent Girls and Young Women (EPAG) provided 6 months of livelihoods and life skills training (in either a Job Skills or Business Development Services track) and 6 months of follow up support to facilitate self or wage employment.	Among participants there was no significant reduction in the number of sexual partners or increase in condom use as a result of the 1 year intervention. There was also no difference in these outcomes between the treatment and intervention arms.	Medium

(Continued)

Table 12. Continued.

Author & date	Location	Study population	Study design	Intervention	Main results	Quality ranking
Bandiera et al. (2012)	Uganda	4800 adolescent girls	Cluster RCT to evaluate the effects of the Empowerment and Livelihoods for Adolescents (ELA) program	ELA combined the provision of life skills to reduce risk behaviors and vocational skills training to start small income-generating activities	After 2 years, among those sexually active, routine condom use increased by 25% ($p < 0.05$) and the number of girls reporting having sex unwillingly dropped from 21% at baseline to under 4% ($p < 0.01$). The intervention group also had a 26% lower rate of fertility over 2 years ($p < 0.05$).	Medium
Goodman et al. (2014)	Rural Kenya	707 OVC headed households (age 13 to 25)	Stratified random, cross-sectional survey to assess differences among three program cohorts (those involved for 4 months, over 1 year, and over 2 years) in a range of outcomes, including sexual practices	3-year intervention grouping 20–40 families together for vocational training, group IGAs, and provision of business start-up kits. They also received weekly group trainings on business, health, hygiene, and agriculture. Some families received cash transfers.	Among females, those in higher cohorts (involved in the program longer) had fewer sex partners ($p = 0.03$) and greater condom use at last sexual encounter ($p = 0.015$). Among males there was no significant difference in number of sexual partners or condom use between cohorts.	Medium
Odek et al. (2009)	Nairobi, Kenya	227 adult female sex workers	Pre- and post-intervention study without control to assess the effects of adding microenterprise to an existing HIV intervention on sexual risk behaviors	Group microcredit, business skills training, and savings promotion were added to an existing program of peer-mediated STI/HIV prevention and care education and condom promotion	After 2 years, the mean number of sex partners in the preceding week changed from 3.26 to 1.84 ($p < 0.001$). Condom use with casual sex partners remained high at both survey points (93.8% to 95.4%) while consistent condom use with regular partners increased from 78.9% at baseline to 93.5% at end line ($p = 0.03$). In addition, 45.4% of participants reported stopping sex work.	Medium
Dunbar et al. (2010)	Chitungwiza and Epworth, Zimbabwe	50 adolescent, female, out-of-school orphans	Pre- and post-intervention surveys to assess the feasibility of the intervention	SHAZ! pilot, which combined life skills education for HIV prevention, business training and mentoring, and access to microcredit	At 6 months, participants reported no significant change in condom use from baseline to end line. Increased exposure to physical harm, sexual abuse, and coercion was noted in the qualitative interviews and supported by the following quote: "In the bus compound I always encountered men who wanted to have a relationship with me. I would tell them I was married or that I wasn't interested, but it wouldn't stop them."	Low
Lee et al. (2010)	Siem Reap, Cambodia	30 female beer sellers age 19–31	Participatory action research to assess the effects of the Hotel Apprenticeship Program (HAP) on health knowledge, self-efficacy, and sexual risk behaviors	HAP included a 24-month hotel mentoring internship with a guaranteed living wage of USD 110/month, along with classes in Khmer literacy, English, health education, and life and social skills education.	There were no significant differences in condom use at last encounter, condom suggestion, or successful condom negotiation between baseline and program responses at various time points within the intervention. Program dropouts were more likely to have used a condom at last encounter than participants ($p = 0.05$). None of the participants indicated they reengaged in beer selling or indirect sex work nine months after the end of the intervention.	Low
Rotheram-Borus et al. (2012)	Kampala, Uganda	100 youth age 13–23	Pilot pre- and post-intervention assessment of HIV risk behaviors among those receiving HIV education plus vocational training compared to those with HIV education only; cohort study of effects of combined intervention over time	Half immediately received vocational training apprenticeships with local artisans, and the other half received the same intervention after the 4-month follow-up; all participants received 10 sessions of weekly HIV prevention training.	At four-month follow up, there were no significant differences between the arms in average number of sexual partners, or in abstinence or 100% condom use. After 24 months, the combined intervention groups showed decreases from baseline in the average number of sex partners (2.12 to 1.12, $p = 0.013$), and increases in abstinence or 100% condom use (45% to 71%, $p = 0.003$).	Low

Table 13. Studies of employment support on HIV prevention outcomes.

Author & date	Location	Study population	Study design	Intervention	Main results	Quality ranking
Jewkes et al. (2014)	Durban, South Africa	232 out-of-school youth age 17–34	Time-series study to assess the effects of the intervention on HIV risk, IPV, economic, and social outcomes	Training on livelihood strengthening through finding work or establishing a business, combined with HIV, gender, and violence prevention training	After 58 weeks, for women there was a significant reduction in the experience of sexual IPV from 9.8% at baseline to 3.6% ($p = 0.033$), though for men there was no change in perpetration of sexual IPV. For women, there were positive but not statistically significant changes condom use at last sex and engagement in transactional sex, while there was no change in these metrics for men.	High
Adoho et al. (2014)	Monrovia, Liberia	2106 females age 16–27 not enrolled in school	RCT comparing economic, empowerment, and health outcomes between participants and controls	Economic Empowerment of Adolescent Girls and Young Women (EPAG) provided livelihoods and life skills training (in either a Job Skills or Business Development Services track) and facilitation of self or wage employment.	Among participants there was no significant reduction in the number of sexual partners or increase in condom use as a result of the intervention. There was also no difference in these outcomes between the treatment and intervention arms.	Medium
Visser et al. (2015)	South Africa (KZN, Eastern Cape, Mpumalanga, Gauteng)	604 former OVC age 18–25	Post-intervention study investigating differences in HIV risk behavior and other outcomes between former ISIBINDI participants and a control group	The core of the ISIBINDI model is home visits to promote OVC wellbeing, and includes optional components of career guidance, job empowerment, food gardens, and IGAs	12.9% of ex-participants of ISIBINDI reported HIV risk behavior compared to 19.7% of controls ($p = 0.012$). 66.7% of participants received career guidance.	Medium
Conyers and Boomer (2014)	Throughout the USA	1873 PLHIV of diverse backgrounds recruited from AIDS service organizations and networks	Cross-sectional study to examine the role of vocational rehabilitation in health care access and risk of transmission among PLHIV	State Federal Vocational Rehabilitation System (VR) through which rehabilitation counselors provide a range of services to facilitate employment and referrals to supportive services; 24% of sample had used VR.	Use of VR was significantly associated with lower reported combined health risk behaviors, $\beta = 0.15$ ($p < 0.001$), including less unprotected sex ($\lambda = 0.65$).	Low

Table 14. Ongoing studies of HIV prevention outcomes.

Study title	Country	Study population	Study design	Intervention	Outcomes studied
A randomized study evaluating an intervention integrating economic strengthening and HIV prevention programs for vulnerable youth in South Africa	South Africa	Up to 2000 adolescents age 14–17; up to 36 caregivers; and up to 12 program implementers	Factorial RCT with qualitative and costing components	Comparison of an integrated HIV prevention plus HES (financial capabilities education, youth-friendly savings groups) intervention, with HES only, HIV prevention only, and a control group	STI prevalence, sexual risk behaviors, and pregnancy
The Synergy Study: A Social-Ecological Exploration of the Relationship between Economic Factors and HIV Risk among Adolescents	South Africa	60 adolescent girls and boys age 14–17	Mixed methods, descriptive cohort study to assess synergistic effects of combining HES and HIV programing on attitudes and risk behaviors	Financial literacy and savings promotion, employment and entrepreneurial training, support for access to higher education, plus an HIV risk reduction curriculum	HIV risk behaviors
The IMAGE replication trial: A three-armed, cluster randomized, controlled trial in Mwanza city	Tanzania	2640 women organized into 132 groups	IMAGE replication consisting of two RCTs and an in-depth qualitative study; process evaluation and economic evaluation	Comparison of group microcredit only to group microcredit plus gender training; and comparison of gender training to no intervention	Exposure to IPV

USD 96 per month making them difficult to compare across contexts. Thirteen of the 14 studies assessed outcomes for adolescents, and one assessed risk among male sex workers (MSW), while none included a general adult population. The majority ($n = 10$) of the studies in this section assessed UCTs independently, making the evidence more compelling.

Of those focused on adolescents, six articles assessed the effects of the South African Child Support Grant and/or Foster Care Grant on adolescent risk behaviors and HIV incidence; four were from a single observational study that assessed the effects of “cash plus care”. Across all studies with adolescents, when looking at self-reported HIV risk behaviors such as sexual debut, sex frequency, condom use and number of partners, the study quality is high, and the directions of effect are positive for one or more outcome of interest, with no negative findings (Baird, Chirwa, McIntosh, & Ozler, 2015; Baird, Garfein, McIntosh, & Ozler, 2012; Cluver et al., 2013; Cluver, Orkin, Boyes, & Sherr, 2014; Cluver, Orkin, Meinck, Boyes, Yakubovich, et al., 2016; Cluver, Orkin, Yakubovich, & Sherr, 2016; DSD, SASSA, & UNICEF, 2012; Goodman, Kaberia, Morgan, & Keiser, 2014; Handa, Halpern, Pettifor, & Thirumurthy, 2014; Khoza et al., 2016; Rosenberg, Pettifor, Thirumurthy, Halpern, & Handa, 2014; Siaplay, 2012). Positive findings were seen more consistently for girls than boys.

A randomized controlled trial (RCT) conducted in Malawi also found promising clinical evidence (lower herpes simplex virus [HSV-2] and HIV prevalence in the intervention group), suggesting that the behavioral effects of UCTs could translate into lower likelihood of infection for adolescent females, though HIV incidence was not measured (Baird et al., 2012). However, findings of a follow-up study with the same population suggest that the effects of UCTs on sexual behaviors of adolescent females may not be sustained beyond the end of the intervention (Baird et al., 2015). Of the five studies that assessed UCTs in combination with different kinds of support for adolescents – including school support, food support, vocational training, income generation, agriculture training and health training – all indicate a positive result from these integrated interventions.

Only one study of UCTs was not conducted with an adolescent population. This smaller RCT with MSM in Mexico found that UCTs increased reported condom use, but there were no effects on partner reduction or on clinical outcomes of STI incidence, including HIV (Galárraga et al., 2017).

Conditional cash transfers. Thirteen studies provide evidence linking conditional cash transfers (CCTs) with HIV prevention, including one on prevention of

mother-to-child transmission (PMTCT) (Table 4). Of these, four were high quality, while three were medium-high, three were medium, and one was low quality; two were not assessed. Eleven of the studies were based on data from RCTs, usually allowing for more direct measure of causality. Most ($n = 10$) also assessed CCTs independently. More than for any other intervention ($n = 6$ studies), clinical outcomes were assessed. Variation in the conditions – ranging from school attendance to negative STI test results – highlights the different pathways by which CCTs might influence HIV risk. For several studies, conditionality was tied to non-routine biomedical testing for HIV or STIs, which would be complicated and costly to administer in real-world settings. Like UCTs, the range of transfer amounts (USD 4–75) and variation in distribution frequency limits comparability.

Seven studies focused on an adolescent population. Five of these used experimental designs, four of which only included females. Most were conditioned on school attendance or performance, highlighting a common theory of change that keeping adolescents in school reduces HIV risk. Overall, studies with adolescents show a positive trend in reducing self-reported sexual risk behaviors such as frequent sex, unprotected sex and age-disparate sex, particularly for females (Baird et al., 2012; Baird, Chirwa, McIntosh, & Ozler, 2010; Khoza et al., 2016; Pettifor et al., 2016). In contrast, a study in Mexico with both male and female adolescents found no association between self-reported risk behaviors and CCTs comprised of cash and food and conditioned on school attendance and receipt of preventative medical care (Galárraga & Gertler, 2009).

Three CCT studies with adolescents assessed clinical outcomes and all used experimental designs. The study in Malawi by Baird and colleagues (2012), referenced in the previous section, also found that CCTs conditioned on school attendance resulted in lower HSV-2 and HIV prevalence. Another study found CCTs conditioned on school attendance reduced self-reported IPV among females in South Africa (Pettifor et al., 2016), though there was no effect on HIV incidence. Another study in South Africa found CCTs conditioned on participation in a life skills program, educational performance, and HIV testing uptake reduced HSV-2 incidence among both boys and girls (Abdool Karim et al., 2015), but did not demonstrate impact on HIV incidence.

Among studies with adults, three papers were based on the RESPECT RCT in Tanzania, two of which also assessed clinical outcomes. They found that CCTs conditioned on negative STI test results reduced the likelihood of testing positive for STIs in younger adults,

although HIV incidence was not assessed as an independent outcome (de Walque et al., 2012; de Walque, Dow, & Nathan, 2014). Initial reductions in self-reported sexual risk behaviors were not sustained after the end of the intervention (Packel, Dow, de Walque, Isdahl, & Majura, 2012). This is consistent with a study in Malawi that found no effect of a CCT conditioned on staying HIV-negative on adult clinical HIV status or risk behaviors after two years (Kohler & Thornton, 2012).

Two studies were conducted with other target populations. In the study of MSM in Mexico noted in the previous section, participants reported greater condom use as a result of CCTs conditioned on negative STI test results, but no effects were seen on STI or HIV incidence (Galárraga et al., 2017). Among HIV-positive pregnant women in the Democratic Republic of the Congo, CCTs conditioned on attending scheduled clinic visits and completing associated actions increased uptake and retention in PMTCT care, reducing the risk of vertical transmission (Yotebieng et al., 2016).

Financial incentives. Seven studies examined financial incentives and HIV prevention outcomes, all of which found positive results (Table 5). Of these, two were high quality, while one was medium-high, and three were medium quality; one was not assessed. All but one study examined financial incentives independently, providing greater confidence that the results are directly associated with the incentive. Incentive amounts ranged from USD 2.50–100, each of which incentivized unique behaviors.

An RCT in Lesotho examined a unique lottery scheme that incentivized negative test results for curable STIs, which reduced both the number of reported high risk sexual acts and HIV incidence among younger adults (Nyqvist, Corno, de Walque, & Svensson, 2015). Another study found that financial incentives combined with life skills education and sexual health promotion for adolescent minorities in the United States were associated with safer sex practices (Minnis et al., 2014).

In Kenya, three studies, two of which used experimental designs, assessed financial incentives to motivate uptake of voluntary male medical circumcision (VMMC) finding that fixed compensation amounts were effective, while a high-value lottery scheme was not (Evens et al., 2016; Thirumurthy et al., 2014; Thirumurthy et al., 2016). Two additional studies looked primarily at an HIV testing outcome but are included in this paper because of their focus on preventing onward transmission of the virus. The first found that incentives were associated with more pregnant women in India receiving HTS (Madhivanan et al., 2013); the second found incentives encouraged HIV-positive married men in Pakistan to disclose their HIV status

and bring their wives in for testing, and were marginally associated with increased condom use (Khan, Qazi, Nazim, & Khan, 2012).

Food assistance. Seven references evaluated food assistance, all of which focus on adolescent populations and assess effects on self-reported sexual risk behaviors or sexual exploitation (Table 6). Of these, two were high quality, while one was medium-high, and four were medium quality. No food assistance studies used experimental designs or measured clinical outcomes.

Most of the evidence for this intervention comes from four papers from the same large prospective study looking at the combined effects of cash transfers, school feeding and/or food gardens as forms of “cash” assistance to adolescents in South Africa. These papers, which were also cited in the section on UCTs, found food aid was associated with lower risk behaviors in combination with other support, and independently for girls only (Cluver et al., 2014; Cluver, Orkin, Meinck, Boyes, Yakubovich, et al., 2016; Cluver, Orkin, Yakubovich, & Sherr, 2016). “Cash” (including school feeding) moderated the pathway from structural drivers of risk, to psychosocial problems, to HIV risk taking (Cluver, Orkin, Meinck, Boyes, & Sherr, 2016).

Another study in South Africa found a combined intervention, including home visits, and job support, income generating activities, and food gardens for some, was associated with lower HIV risk among former OVC (Visser, Zungu, & Ndala-Magoro, 2015). In contrast, a study in Mexico, also cited above under CCTs, found that bimonthly transfers in the form of food rations and financial assistance had no effect on adolescent risk (Galárraga & Gertler, 2009). Food assistance also did not reduce unprotected sex among HIV-positive adolescents in South Africa (Toska et al., 2016).

Educational support. Ten studies assessed the effects of school support on HIV outcomes and all focused on an adolescent population (Table 7). Two were high quality, while four were medium-high, and four were medium quality. All measured self-reported risk outcomes, though one was conducted with an HIV-positive population. Five studies used experimental designs and six assessed education support independently.

All but one study found at least some positive risk reduction outcomes, with no negative findings (Baird et al., 2010; Cho et al., 2017; Cluver, Orkin, Meinck, Boyes, & Sherr, 2016; Cluver, Orkin, Meinck, Boyes, Yakubovich, et al., 2016; Cluver, Orkin, Yakubovich, & Sherr, 2016; Hallfors et al., 2011; Hallfors et al., 2015; Luseno, Zhang, Rusakaniko, Cho, & Hallfors, 2015; Toska et al., 2016). Risk behaviors assessed include

sexual debut, early marriage, pregnancy, unprotected sex, number of sexual partners, and transactional sex, among others, though there was variation among the studies in which behaviors were affected. A study, also noted in the previous section, found that school support was associated with less unprotected sex among HIV-positive adolescents in South Africa (Toska et al., 2016), lending further weight to the evidence for risk reduction effects, and indicating benefits may extend to reducing the risk of onward transmission.

Three studies also measured clinical outcomes. Two related studies, one of which used an experimental design, assessed HIV prevalence among adolescents in Zimbabwe and found no significant effects (Hallfors et al., 2015; Luseno et al., 2015). A third study also used an experimental design but lacked the power to detect a difference in HIV or HSV-2 incidence among adolescents in Kenya (Cho et al., 2017).

Protection interventions

Savings (individual and group). Of the six savings studies identified, two focused on individual savings and four on group savings approaches (Table 8). Two savings studies were high quality, while one was medium-high, and two were medium quality; one was not assessed. Four studies were conducted with FSW and two with adolescent girls. All the studies in this section are based on combined interventions which included explicit health components, and only two studies examined the independent effects of savings: one had positive results, the other negative. Therefore, for the majority of studies, it is impossible to know whether the observed health effects were a result of the savings component, another intervention component, or the combined effects. None of the studies assessed clinical outcomes, all were based on self-reported risk factors.

The evidence from three studies with FSW, one of which used an experimental design, suggests that group or individual savings interventions combined with HIV risk reduction education/support may be protective for this population (Mantsios et al., 2016; Swendeman, Basu, Das, Jana, & Rotheram-Borus, 2009; Witte et al., 2015). Outcomes from a fourth study with FSW in India were less conclusive (Pillai, Bhattacharjee, Ramesh, & Isac, 2012).

In contrast, there were negative findings for adolescent girls in relation to sexual harassment for participants in a savings-only intervention in Uganda (Austrian & Muthengi, 2014). Reductions in ability to refuse sex and condom use over time were found among female adolescents in a multi-component intervention combining group savings with training on

business management and reproductive health and formal microcredit in Kenya (Erulkar & Chong, 2005).

Financial capabilities education and training. Only three studies evaluated the effects of financial education on self-reported risk reduction (Table 9). All three used randomized designs, though one was rated as high quality, one medium-high, and one low quality. Each was conducted with a different target population: FSW, adolescents and out-of-school OVC. All three studies integrated financial education with other support, including other HES components and HIV risk reduction support, limiting any direct attribution to the financial education component.

Participation in an integrated intervention comprised of financial literacy, business development support, savings, and risk reduction training by FSW in Mongolia (also included in the saving section of this paper) was associated with fewer unprotected sex acts and fewer paying sex partners compared to risk reduction training alone (Witte et al., 2015). Female adolescent OVC in Zimbabwe reported reductions in risk behaviors over the period of an intervention that combined sexual health, life skills training, social support, financial literacy, and vocational training, but the results were not significantly different from controls (Dunbar et al., 2014). The study measured but was not powered to detect differences in HIV and HSV-2 incidence. A youth development activity in South Africa, including health and social capabilities training, and financial literacy for some, reported less risk behavior among boys in the intervention compared to controls, but tests of significance were not reported (Hallman & Roca, 2011).

Income generation. Six studies evaluated the effects of income generating activities (IGAs) on HIV prevention, half of which focused on adolescents (Table 10). Two of the studies in this section were medium-high quality while three were medium quality, and one was not assessed. None used a randomized design. Most of the studies assessed combined interventions, thereby limiting the direct connection between IGAs and HIV prevention outcomes. There was variation in the behavioral and structural outcomes measured and no clinical outcomes were assessed.

Youth involved in non-agricultural IGAs in Republic of Congo reported less unsafe sex (Bazika, 2007), while a study by Visser and colleagues, described under the food assistance section of this paper, found that a combined intervention in South Africa, including IGAs for some, was associated with lower HIV risk among former OVC in South Africa (2015). Similarly, a combined HES intervention including IGAs, business and

vocational training, and UCTs for OVC-headed households in Kenya was associated with lower self-reported risk among female participants but not males (Goodman et al., 2014).

A small study of drug-using FSW in the United States found positive associations between a combined risk reduction and IGA intervention and several risk reduction outcomes (Sherman, German, Cheng, Marks, & Bailey-Kloche, 2006). A qualitative study with an adult female population in Kenya reported that participation in an IGA was not protective against HIV risks, including IPV (Gnauck et al., 2013). A final qualitative study with an HIV-positive adult population in Kenya found an IGA plus an in-kind loan for farming inputs reduced behaviors associated with onward transmission of HIV (Zakaras et al., 2016).

Promotion interventions

Microcredit. Of the 10 microcredit studies identified, nine focused specifically on females (Table 11). Of these, two were high quality, while two were medium-high, four were medium, and two were low quality. Most evaluated combined interventions and only three assessed microcredit independently. Importantly, some of the interventions were designed to support highly vulnerable groups and built in protections to avoid harm, while others were less protective or flexible. GBV is associated with increased risk of HIV (Dunkle & Decker, 2013) and these outcomes were explored for microcredit services more than any other HES intervention.

Three papers focused on an RCT of an integrated microcredit, gender and HIV training and community mobilization intervention in South Africa, finding that participants experienced less IPV than controls (Pronyk et al., 2006), and women age 14–35 reported less unprotected sex (Pronyk et al., 2008). A third analysis from the same trial compared the integrated intervention to microcredit alone, and to a control group, finding that only the integrated intervention was associated with lower IPV while condom use outcomes were not statistically significant (Kim et al., 2009). Similarly, a study of adult females in Haiti found no independent association between involvement in microcredit and condom use among the full study population (Rosenberg, Seavey, Jules, & Kershaw, 2011).

In a qualitative study in Malawi, female fish traders reported that microcredit increased their vulnerability to HIV (MacPherson et al., 2015). In addition, two studies of combined sexual health and HES interventions, including microcredit, had negative findings for adolescent females. The first, was described previously and found decreases in ability to refuse sex and condom use over time in Kenya (Erulkar & Chong, 2005). The

other found a qualitative association between participation in an HIV risk reduction, business support and microcredit intervention and higher exposure to harassment and sexual abuse in Zimbabwe (Dunbar et al., 2010).

Both microcredit studies with FSW found that combined interventions comprised of HIV risk reduction support and multiple HES components including microcredit, were associated with self-reported risk reduction, and one found a reduction in STI incidence though the study quality was low (Odek et al., 2009; Sovereign et al., 2013). Finally, adult PLHIV in Kenya participating in a qualitative study cited in the previous section of this paper, reported reduced behaviors associated with onward transmission of HIV resulting from a combined intervention, including microcredit (Zakaras et al., 2016).

Vocational and entrepreneurial training. Eleven studies of vocational and entrepreneurial training measured HIV prevention outcomes (Table 12). Of these, two were high quality, while two were medium-high, four were medium, and three were low quality. These interventions were targeted at reducing risk among specific groups, including FSW (four studies) and adolescents (seven studies, five of which were delivered only to females). This evidence base is focused heavily on self-reported risk reduction outcomes.

Among adolescents, a previously described combined HES intervention including vocational training in Kenya was associated with lower reported risk among female OVC household heads, but not males (Goodman et al., 2014), while an RCT in Uganda found that girls in an integrated risk reduction and vocational training intervention reported lower sexual risk behaviors (Bandiera et al., 2012). Similarly, a combined vocational training and HIV risk-reduction intervention for youth in Uganda found reductions in sexual risk over the course of the intervention (Rotheram-Borus, Lightfoot, Kasirye, & Desmond, 2012). An RCT by Dunbar and colleagues described above found no significant risk reduction effects of integrated intervention for female OVC in Zimbabwe, and was underpowered to detect differences in clinical outcomes (2014). Two studies described in previous sections of this paper of combined interventions with entrepreneurial training components had negative findings for adolescent females, including exposure to harassment and sexual abuse in Zimbabwe (Dunbar et al., 2010) and decreases in ability to refuse sex and condom use in Kenya (Erulkar & Chong, 2005). The two studies that independently evaluated this type of training for adolescents, one of which used an experimental design, found no independent associations or

effects (Adoho, Chakravarty, Korkoyah, Lundberg, & Tasneem, 2014; Rotheram-Borus et al., 2012).

The four vocational/entrepreneurial training interventions delivered to FSW were combined with HIV prevention education, and in some cases other HES support. However, the three higher quality studies, two of which used randomized designs, found positive associations or effects on reported behaviors, including fewer sex partners, fewer paying partners, and increased condom use (Odek et al., 2009; Sherman et al., 2010; Witte et al., 2015). Only one small experimental study, assessed the independent effects of skills training for FSW, which found positive results for partner reduction compared to HIV education alone (Sherman et al., 2010). One low quality study found no association between a vocational training intervention combined with literacy, health and life skills education, and condom behaviors in this population (Lee et al., 2010).

Employment support. Four studies of employment support were identified (Table 13). One was high quality, while two were medium, and one was low quality. Three studies were conducted in sub-Saharan Africa and assessed risk reduction outcomes. An intervention for adolescents in South Africa, combining risk reduction with support to find work or establish a business, found reductions in IPV reported by females, but not in IPV perpetration reported by males (Jewkes et al., 2014). Another study in South Africa described elsewhere in this paper, found a combined intervention, including career guidance, was associated with lower HIV risk among former OVC (Visser et al., 2015). In contrast, an RCT assessed the independent effects of employment support for adolescents and found no association with reported condom use or partner reduction (Adoho et al., 2014).

The fourth study was conducted in the United States with a diverse population of PLHIV and found that use of vocational rehabilitation services was associated with less unprotected sex (Conyers & Boomer, 2014).

Ongoing studies

Three ongoing studies were also identified that focus on HIV prevention (Table 14). Two of these include savings services and financial services, which will bolster the evidence base for these interventions, and may allow for identification of stronger trends. One of the studies will measure STI prevalence, providing clinical evidence that is currently lacking for savings and financial capabilities.

The studies are investigating a range of combined interventions, two of which have an explicit HIV risk reduction component. However, two have factorial

designs and the third is using a mixed-methods design to assess the relative contributions of intervention components and synergies between HES and HIV-specific components. Together they represent a shift from how combined HES and HIV interventions have been studied to date, since they are designed specifically to understand the contribution of the HES components to the outcomes.

Discussion

Combining biomedical, behavioral, and structural approaches, tailored to different contexts, is essential for effective HIV prevention (Bekker, Beyrer, & Quinn, 2012). Increasingly, economic interventions, which work through several pathways to reduce risk, are being integrated into prevention programming. With 64 relevant pieces of research, the evidence for prevention is the strongest of the three broader outcome areas in this series. This research represents evidence from 17 countries, though over 78% of the studies were conducted in sub-Saharan Africa, compared to nearly 13% in Asia and over 9% in North America. Overall, 47% of the studies focused only on females, highlighting the disproportionate burden of HIV incidence borne by females, as well as a connection between economic insecurity and HIV risk, that is particularly salient for women and girls. By comparison only 6% of the studies focused on males, while 47% included both male and female participants. A slight majority of prevention studies ($n = 33$) focused on adolescent populations (of those 13 focused on female adolescents only), underscoring the importance of this population to global epidemic control. Most studies reported positive results, with only five reporting negative primary outcomes. This indicates a positive trend linking HES and HIV prevention, but could also reflect publication bias.

Most of the prevention research to date has focused on provision interventions, which are often easier to study because the causal link between intervention and outcome is more direct, and the intervention itself is generally more standardized. The strongest and most conclusive evidence for prevention also comes from provision interventions, with robust and positive results related to CCTs, UCTs, financial incentives, and educational support on risk behaviors with known linkages to HIV transmission.

Evidence for UCTs, CCTs, and education support is particularly positive in relation to adolescent risk reduction. For UCTs, positive findings were seen more consistently for girls than boys, which may be a result of the pathways through which they influence adolescent sexual behavior, such as reducing transactional sex and increasing school attendance, though only minimal data on the pathways of

effects are presented in these studies. Interestingly, all 13 studies of UCTs for adolescent prevention were conducted in only three countries (South Africa, Malawi, and Kenya), which calls into question the applicability of these results in other contexts. Among CCT studies, the more consistent positive findings for adolescents compared to adults – especially when combined with the results of UCT studies – suggest an important window of opportunity in which CTs may have the greatest impact, particularly for females whose HIV risk is disproportionately higher during adolescence (Kharsany & Karim, 2016).

The evidence base for education support points to its effectiveness – provided either independently or in combination with other support – in reducing at least some self-reported HIV risk behaviors among vulnerable adolescents, particularly females. All the studies of food assistance evaluated integrated interventions that included educational, psychosocial, and/or economic support components, and only two were designed to assess food aid independently. This body of literature indicates, however, that the inclusion of food aid with other prevention services may support adolescent risk reduction, particularly among HIV-negative females.

Financial incentives may be particularly useful for motivating discrete or delimited behaviors. Compared to other HIV prevention outcomes, PMTCT is time-bound and linked to a well-defined set of actions and services for which financial incentives could be appropriate. The research to date is scant but indicates positive associations, and additional research is suggested. VMMC is also a natural area where financial incentives can directly influence a specific one-time behavior, and the limited evidence supports their effectiveness.

Beyond provision the evidence is far less conclusive. Studies on vocational and entrepreneurial training indicate that including this support could bolster HIV prevention efforts for FSW and possibly adolescents by reducing reliance on unsafe paid or transactional sex, though they must be designed carefully to avoid inadvertently increasing vulnerability. Studies of group and individual savings also show a protective trend for FSW. However, findings are mixed for adolescents, and while the evidence base is small, harmful gender-related outcomes warrant further investigation within this population. Given the limited comparability of the interventions themselves, varied study quality, and incongruous findings, the combination of group and individual savings forms one of the least conclusive evidence bases in this review. The evidence for IGAs suggests a positive trend, particularly in relation to female adolescent or OVC self-reported risk reduction. However, study quality is moderate and the variation in the interventions indicates these results are highly contextual. The variation in implementation, and in the

behavioral and structural outcomes measured, partially account for the weak evidence bases for both IGAs and savings; however, their broad application in HIV-affected communities highlights both an opportunity and an imperative to better understand their effects on prevention outcomes through more rigorous studies.

The evidence base for microcredit is varied in quality. Of the three studies that assessed microcredit independently, only null and negative findings were reported. Interventions that integrated microcredit with other HES and health services have a more positive trend, but also include a few negative results. Results related to GBV were mixed, highlighting the complexity of microcredit programming and its potential to either mitigate or enhance risk depending on contextual factors. They point to the importance of carefully designing programs to avoid increasing women's vulnerability to HIV or GBV. For both financial capabilities education and employment support, there were small numbers of studies, varying study quality, and differences in target groups and in the overall interventions studied. Drawing conclusions in relation to these interventions is cautioned.

Only a handful of studies ($n = 13$) assessed clinical outcomes, while the majority relied on self-reported data which can be unreliable in relation to HIV risk behaviors (Schroder, Carey, & Vanable, 2003). Across all interventions where clinical data were measured, there is a trend of null and underpowered outcomes. Even for UCTs, CCTs, and education interventions, where findings for behavioral outcomes are among the strongest, the biological outcomes are far less conclusive. Of the six studies with positive clinical outcomes, only one reflects an effect on HIV incidence (Nyqvist et al., 2015). While nine studies measured HIV incidence, only three were powered to detect a difference between study arms and only one found this to be a statistically significant outcome. The discordance between the mostly positive self-reported behavioral outcomes and the less conclusive clinical outcomes highlights the possibility that the self-reported measures of HIV risk lack validity, or that the magnitude of effect of HES support on risk behavior is insufficient to reduce HIV incidence. The considerable funding and time required to rigorously assess HIV incidence has hindered adequate research in the HES field. However, well-powered and well-designed research is still needed to confirm whether HES can effectively contribute to HIV incidence reduction.

HES interventions can affect HIV outcomes through a myriad of potentially complex pathways. Overall, the qualitative evidence base was too limited to allow for any delineation of these causal pathways. As quantitative evidence continues to expand our understanding of which HES interventions are effective, additional

qualitative and mixed-methods research is needed to understand the mechanisms of those effects.

A large proportion of the studies in this review assessed the effectiveness of integrated programs, grouping either multiple HES interventions and/or an HES intervention with health or other social interventions; most did so without being able to isolate the direct association or effect of any one intervention component. This provides evidence about what combinations of interventions are effective, but the contribution of each intervention component to the outcome(s) remains unknown.

Study limitations

Categorization into each intervention and outcome was done through thorough assessment of the context and descriptions provided in each study. Where these methodological details were limited, categorization was based on a careful assessment of available information. Although the quality assessment approach was selected for its applicability to this review, the use of a quality assessment introduces reviewer bias into the analysis. We attempted to mitigate this by creating a structured and defined codebook to minimize subjectivity for each aspect of the assessment, and two reviewers completed the assessment. Given the breadth and variation between the characteristics of studies in the review, the analytical framework that was used may not have allowed for the identification of additional trends.

Conclusions

The evidence in this review suggests that several HES interventions – particularly provision interventions such as UCTs, CCTs financial incentives and educational support – are effective in reducing self-reported HIV risk behaviors. The lack of similar positive evidence for clinical outcomes tempers the enthusiasm for these approaches and calls into question their true effectiveness in preventing HIV. Nonetheless, several high-quality studies rigorously measured and analyzed risk reduction outcomes, suggesting that these HES interventions may be an important component of risk reduction efforts in many contexts.

The comparatively limited and lower-quality evidence base for protection and promotion interventions demonstrates the need for additional research on their effectiveness for HIV prevention. As the field advances, stronger research designs are needed to understand how HES works within an integrated package of services, the causal pathways by which these interventions affect behavior change, and whether they affect clinical outcomes.

Note

1. Green (positive) = positive findings on one or more primary outcome of interest and no negative findings; blue (null) = no effect/association was observed on primary outcome(s) or study was under-powered; yellow (mixed) = a mix of positive and negative results on primary outcomes of interest; and red (negative) = negative findings on one or more primary outcomes of interest and no positive findings.

Acknowledgments

We would like to acknowledge the excellent work of Cheryl Tam, formerly of FHI 360, in screening and assessing the quality of articles included in this review. We are grateful to several FHI 360 colleagues, including Whitney Moret for her contributions to this manuscript, Allison Burns and Tamara Fasnacht for their support in the literature search, and Jenae Tharaldson for her assistance preparing the manuscript. Finally, we would like to thank the researchers, donors and practitioners who participated in the half-day consultative meeting held on July 13, 2016 for their thoughtful input and expertise on this topic. The contents are the responsibility of FHI 360 and do not necessarily reflect the views of USAID or the United States Government.

Disclosure statement

The author has no conflicts of interest to declare.

Funding

This study was produced under United States Agency for International Development (USAID) Cooperative Agreement No. AID-OAA-LA-13-00001 and was made possible by the generous support of the American people through USAID and the United States President's Emergency Plan for AIDS Relief. The contents are the responsibility of FHI 360 and do not necessarily reflect the views of USAID or the United States Government.

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Appendices

Appendix 1. Database search strings for full review

- 1) (((("HIV" OR "HIV/AIDS" OR "acquired immune deficiency syndrome" OR "acquired immunodeficiency syndrome")) AND (("school fees" OR "tuition payment" OR "bursaries" OR "school grants" OR "school facilitation" OR "education facilitation" OR "youth training" OR "workforce education" OR "workforce readiness" OR "economic strengthening" OR "microfinance" OR "micro-finance" OR "micro finance" OR microcredit OR microenterprise OR "micro-enterprise" OR "savings" OR "loan" OR "loans" OR "lending" OR "skills development" OR "skills building" OR "income generation" OR "income generating activity" OR "income generating

- activities” OR “food-for-work” OR “food for work” OR “cash-for-work” OR “cash for work” OR (“transfer” OR “transfers” AND (“cash” OR “asset”)) OR “financial incentives” OR “social protection” OR “livelihood” OR “livelihoods” OR “apprenticeship” OR (“voucher” OR “vouchers” OR “allowance” AND (“transport” OR “transportation” OR “travel”)) OR (“training” OR “trainings” OR “education” AND (“vocational” OR “entrepreneur” OR “entrepreneurship” OR “entrepreneurial” OR “finance” OR “financial”)))) AND ((“prevention” OR “prevent” OR “incidence” OR “transmission” OR “transmit” OR “acquire” OR “acquisition” OR PMTCT OR MTCT OR “behavior” OR “behaviour” OR “behaviors” OR “behaviours” OR “risk” OR “risks” OR “risky” OR “sexual activity” OR “sexual activities” OR “condom” OR “condoms” OR “male circumcision” OR “partner reduction” OR “number of partners”))
- (2) (((“HIV” OR “HIV/AIDS” OR “acquired immune deficiency syndrome” OR “acquired immunodeficiency syndrome”)) AND ((“HIV care” OR “home-based care” OR “home based care” OR “antiretroviral” OR “antiretroviral treatment” OR “ARV” OR “HAART” OR “adherence” OR “retention” OR “CD4” OR “viral load” OR “viral loads” OR “opportunistic infection” OR “opportunistic infections” OR “co-infection” OR “co-infections” OR “coinfection” OR “coinfections” OR “morbidity” OR “morbidity” OR “mortality” OR “mortalities”)) AND ((“school fees” OR “tuition payment” OR “bursaries” OR “school grants” OR “school facilitation” OR “education facilitation” OR “youth training” OR “workforce education” OR “workforce readiness” OR “economic strengthening” OR “microfinance” OR “micro-finance” OR “micro finance” OR microcredit OR microenterprise OR “micro-enterprise” OR “savings” OR “loan” OR “loans” OR “lending” OR “skills development” OR “skills building” OR “income generation” OR “income generating activity” OR “income generating activities” OR “food-for-work” OR “food for work” OR “cash-for-work” OR “cash for work” OR (“transfer” OR “transfers” AND (“cash” OR “asset”)) OR “financial incentives” OR “social protection” OR “livelihood” OR “livelihoods” OR “apprenticeship” OR (“voucher” OR “vouchers” OR “allowance” AND (“transport” OR “transportation” OR “travel”)) OR (“training” OR “trainings” OR “education” AND (“vocational” OR “entrepreneur” OR “entrepreneurship” OR “entrepreneurial” OR “finance” OR “financial”))))
- (3) (((“HIV” OR “HIV/AIDS” OR “acquired immune deficiency syndrome” OR “acquired immunodeficiency syndrome”)) AND ((“diagnosis” OR “HIV test” OR “HIV testing” OR “test results” OR “antibody test” OR “ELISA” OR “confirmatory test” OR “counseling and testing” OR “counseling and testing” OR VCT OR HTS))) AND ((“school fees” OR “tuition payment” OR “bursaries” OR “school grants” OR “school facilitation” OR “education facilitation” OR “youth training” OR “workforce education” OR “workforce readiness” OR “economic strengthening” OR “microfinance” OR “micro-finance” OR “micro finance” OR microcredit OR microenterprise OR “micro-enterprise” OR “savings” OR “loan” OR “loans” OR “lending” OR “skills development” OR “skills building” OR “income generation” OR “income generating activity” OR “income generating activities” OR “food-for-work” OR “food for work” OR “cash-for-work” OR “cash for work” OR (“transfer” OR “transfers” AND (“cash” OR “asset”)) OR “financial incentives” OR “social protection” OR “livelihood” OR “livelihoods” OR “apprenticeship” OR (“voucher” OR “vouchers” OR “allowance” AND (“transport” OR “transportation” OR “travel”)) OR (“training” OR “trainings” OR “education” AND (“vocational” OR “entrepreneur” OR “entrepreneurship” OR “entrepreneurial” OR “finance” OR “financial”))))
- (4) (((“HIV” OR “HIV/AIDS” OR “acquired immune deficiency syndrome” OR “acquired immunodeficiency syndrome”)) AND ((“orphans” OR “OVC” OR “OVCS” OR “most at risk” OR “key population” OR “key populations” OR “high risk” OR “injection drug” OR “who inject” OR IDU OR “intravenous drug” OR “needle sharing” OR PWID OR “men who have sex with men” OR “homosexual” OR MSM OR “commercial sex” OR “sex work” OR “sex worker” OR “sex workers” OR “prostitute” OR “prostitutes” OR “prostitution” OR “transactional sex” OR (“partner” OR “partners” OR “partnership” OR “partnerships” AND (“multiple” OR “concurrent”)))) AND ((“school fees” OR “tuition payment” OR “bursaries” OR “school grants” OR “school facilitation” OR “education facilitation” OR “youth training” OR “workforce education” OR “workforce readiness” OR “economic strengthening” OR “microfinance” OR “micro-finance” OR “micro finance” OR microcredit OR microenterprise OR “micro-enterprise” OR “savings” OR “loan” OR “loans” OR “lending” OR “skills development” OR “skills building” OR “income generation” OR “income generating activity” OR “income generating activities” OR “food-for-work” OR “food for work” OR “cash-for-work” OR “cash for work” OR (“transfer” OR “transfers” AND (“cash” OR “asset”)) OR “financial incentives” OR “social protection” OR “livelihood” OR “livelihoods” OR “apprenticeship” OR (“voucher” OR “vouchers” OR “allowance” AND (“transport” OR “transportation” OR “travel”)) OR (“training” OR “trainings” OR “education” AND (“vocational” OR “entrepreneur” OR “entrepreneurship” OR “entrepreneurial” OR “finance” OR “financial”))))

Appendix 2. Quality assessment codebook.

HES and HIV outcomes evidence review

Evidence quality review code book^a

Question	Evidence quality review code book ^a	Ranking (1–3)
	Ranking guidelines	
<i>Conceptual Framing:</i> The process of organizing the concepts, ideas, assumptions, expectations, and beliefs in order to clarify and achieve a research objective. ^b		
1. Does the study acknowledge existing research?	<p><i>Description:</i> High-quality studies acknowledge existing research or theory. They make clear how their analysis sits within the context of existing work.</p> <p><i>Scoring:</i> 3: Study acknowledges the body of existing research and clearly explains how this study fits within and adds value to that body of research. 2: Study acknowledges and discusses some existing research, BUT misses other existing research or does not explain how this study fits within the context of the existing body of evidence. 1: Study does not acknowledge any existing research or theory on the topic, or the existence of related research is noted but not discussed.</p>	-
2. Does the study construct a conceptual framework?	<p><i>Description:</i> High-quality studies construct a conceptual or theoretical framework, which explains the rationale for the investigation being reported, sets out the author's major assumptions, and describes how they think about the issue at hand.</p> <p><i>Scoring:</i> 3: Study clearly explains the key factors, concepts, and variables, and the presumed relationships among them, AND the author's ideas, beliefs, and assumptions about these factors are sufficiently discussed.^b 2: Study clearly explains some of the key factors, concepts, and variables, BUT does not link them specifically in a framework and may or may not discuss the author's ideas, beliefs, and assumptions about these factors. 1: Study does not clearly explain the concepts and relationships being studied, nor does it include the author's ideas, beliefs, and assumptions about these factors.</p>	-
3. Does the study pose a research question or outline a hypothesis?	<p><i>Description:</i> High-quality studies pose specific research questions and may investigate specific hypotheses.</p> <p><i>Scoring:</i> 3: Study poses a specific and empirically testable research question or clear hypothesis that guided the research that is reported in the study. 2: Study poses a research question or hypothesis that guided the research, but it is vague or ambiguous. 1: Study does not pose a specific research question nor outline a clear hypothesis OR the research question does not match what is reported in the study.</p>	-
Total for Conceptual Framing		/9
Average for Conceptual Framing		
<i>Transparency:</i> High quality studies are transparent about the design and methods that they employ, the data that have been gathered and analyzed, and the location/geography in which the data were gathered. This allows for the study results to be reproduced by other researchers, or modified with alternative formulations.		
4. Does the study present or link to the raw data it analyses?	<p><i>Description:</i> High-quality, credible studies will disclose the sources of data, and provide details about the methods of assessment/measurement for all variables/ outcomes of interest.</p> <p><i>Scoring:</i> 3: Sources of data are identified and the details of the method of assessment/ measurement are provided for all variables of interest. 2: Sources of data are identified and the details of the method of assessment/ measurement are provided for more than half of the variables of interest. 1: Sources of data are identified and details of the method of assessment/ measurement are provided for less than half of the variables of interest.^c</p>	-
5. What is the geography/context in which the study was conducted?	<p><i>Description:</i> High-quality studies will describe the geography (location), setting, and context in which the research was carried out.</p> <p><i>Scoring:</i> 3: The study clearly describes the location, setting, and relevant dates (i.e., periods of recruitment, exposure, follow up, and data collection, where relevant).^c 2: Study location is provided, but only some information is provided about the setting and/or dates of different activities of the research. 1: No or very limited information is provided about the study location, setting, or dates of different activities of the research.</p>	-
6. Does the study declare sources of support/funding?	<p><i>Description:</i> Transparency includes openness about any funding behind a study: Research conducted with support from a party with vested interests (e.g., a drug company) may be less credible than that conducted independently. Similarly, a non-governmental organization funding the evaluation of its own work, or collecting its own evaluation data, may introduce bias that skews the findings toward more positive results.</p> <p><i>Scoring:</i> 3: The study states the source of funding and material support, and the role of the funders in the study.^c The funder is not likely to have an interest in having specific results come out of the research. 2: The study states the sources of funding and material support, but does not clarify the</p>	-

Question	Evidence quality review code book ^a	
	Ranking guidelines	
	<p><i>role of the funder in the study and/or the funder may have an interest in having specific results come out of the research.</i></p> <p><i>1: The study does not state the source of funding or other material support and/or the funder is likely to have an interest in having specific results come out of the research.</i></p>	
Total for Transparency	/9	
Average for Transparency	-	
<i>Appropriateness: There are three main types of research design, and many types of methods. Some designs and methods are more appropriate for some types of research exercises than others.</i>		
7. Does the study identify a research design?	<p><i>Description: A research design is a plan that describes how one will study an empirical question. The main categories are: (i) experimental, which includes manipulation of an independent variable AND randomization of treatment and control groups, (also called intervention designs, randomized designs, or RCTs); (ii) quasi-experimental, which typically include one but not both of the features of the experimental design; (iii) observational or non-experimental, which do not include either manipulation of an independent variable or randomization. There are also secondary review studies which tend to be classified as either <i>systematic reviews, non-systematic reviews, or theoretical/conceptual</i> research studies. (Note: the specific terminology above is not required, but the study should provide enough information for reviewers to understand the research design.)</i></p> <p><i>Scoring:</i></p> <p><i>3: The research design is clearly and completely described early in the paper, including any changes to the design after commencement and the reasons.</i></p> <p><i>2: The research design is described but some key elements are missing or lack clarity.</i></p> <p><i>1: The research design is not described.</i></p>	-
8. Does the study identify a research method?	<p><i>Description: The research methods are the specific techniques a researcher uses to collect data (e.g., surveys, in-depth interviews, observation, clinical tests), and analyze data (statistical methods, successive approximation, illustrative, domain, etc.).</i></p> <p><i>Scoring:</i></p> <p><i>3: The research methods are clearly and completely described, including any changes to the methods after commencement and the reasons. Description of the methods includes the techniques used for both data collection and data analysis. The description includes all of the following, where relevant/applicable: (i) describes participant eligibility criteria, (ii) describes methods used to select participants (including control selection), (iii) describes how study size was determined, (iv) describes the interventions being administered/studied, if any, (v) completely defines the primary and secondary outcomes, (vi) describes the statistical or other methods used to assess these outcomes, (vii) explains how missing data were treated, and (viii) describes process associated with randomization and/or blinding.^{c,d}</i></p> <p><i>2: Some of the above elements of research methods are described well, but some lack clarity or sufficient detail.</i></p> <p><i>1: The research methods are not described or lack many important details.</i></p>	-
9. Does the study demonstrate why the chosen design and method are well suited to the research question?	<p><i>Description: Research designs and methods should be selected based on the purpose of the research (e.g., exploratory, descriptive, or explanatory).^e Typically, experimental research designs tend to be more appropriate for identifying, with confidence, the presence of causal linkages between observable phenomena. The implementation of an experimental design is not, in itself, a sign of good quality. The diverse array of observational (or “non-experimental” designs) may be more appropriate for questions that either cannot be explored through experimental designs due to ethical or practical considerations, or for the investigation of perspectives, people, and behaviors that lie at the heart of most development processes.</i></p> <p><i>Scoring:</i></p> <p><i>3: The research design and methods are well matched to the research question and all of the following are true: (i) the sample size is sufficient, (ii) the data collection methods are appropriate, (iii) and the analysis methods are appropriate.</i></p> <p><i>2: The research design is appropriate to answer the research question, BUT the data collection and/or analysis methods are inappropriate or lack rigor.</i></p> <p><i>1: The research design and methods are not appropriate to answer the research question.</i></p>	-
Total for Appropriateness	/9	
Average for Appropriateness	-	
<i>Cultural sensitivity: Even research designs that appear well-suited to answering the question at hand may generate findings that are not credible if they fail to consider local, cultural factors that might affect any behaviors and trends observed. The same events or behaviors may have different meanings depending on the social and cultural context in which they occur.</i>		
10. Does the study explicitly consider any context-specific cultural factors that may bias the analysis/findings?	<p><i>Description: High-quality studies will demonstrate that they have taken adequate steps to consider the effect of local cultural dynamics on their research, or on a development intervention. For example, a study investigates the outcomes of a media campaign to boost girls’ enrollment rates at schools in a religiously</i></p>	-

	<p>conservative community, but fails to explicitly consider the socio-cultural factors which influence parental support for girls' education, and therefore is likely to miss the real reasons why the intervention worked or did not work.</p> <p><u>Scoring:</u> 3: Study discusses all obvious cultural or context-specific factors, and logically describes how these factors could have biased/affected the findings. 2: Study considers some cultural or context-specific factors in relation to possible bias, BUT one or more obvious factors are not discussed or the consideration of these factors in the analysis is not logical. 1: Study does not acknowledge any cultural or context-specific factors OR some are briefly acknowledged but not considered in the analysis/findings.</p>	
Total for Cultural Sensitivity		/3
Average for Cultural Sensitivity		-
<p><i>Validity:</i> This refers to "how well a scientific test or piece of research actually measures what it sets out to, or how well it reflects the reality it claims to represent".^f</p>		
11. To what extent does the study demonstrate measurement validity?	<p><u>Description:</u> Measurement validity relates to whether or not the specific indicator chosen to measure a concept is well-suited to measuring it. For example, is income a valid measure of family welfare, or are specific measures of individual health and happiness more appropriate? Identifying valid measures is especially challenging and important in international development research: just because an indicator is a valid measure in one country or region does not mean it will be equally valid in another.</p> <p><u>Scoring:</u> 3: All of the indicators used in the study are very well suited or "gold standard" measures of the primary outcome(s) of interest in this context. This would include previously validated metrics/scales that are specific to the study location, common indicators that are known to be well-suited to the construct (have high face and content validity), or the study describes how the indicator was validated against an existing metric and shows a high degree of validity. 2: All of the indicators used in the study are at least adequate measures of the primary outcome(s) of interest in this context. This would include common indicators that are known to be reasonable but not gold standard measures of the construct (have moderate face and content validity), or the study describes how the indicator was validated against an existing metric and shows a moderate degree of validity. 1: Some or all of the indicator(s) used in the study are <i>not</i> adequate measures of the primary outcome(s) of interest in this context (have low face and/or content), or insufficient information about the validity of the indicator is provided.</p>	-
12. To what extent is the study internally valid?	<p><u>Description:</u> Internal validity means there are no errors internal to the design of the research that could lead to alternative explanations of the results (despite attempts to institute controls). Internal validity occurs when the hypothesized independent variable alone affects the dependent variable; other variables are threats to internal validity.⁹ Some designs and methods (e.g., experiments and quasi-experiments) are better able than others to determine such cause-and-effect linkages: they will minimize the possibility that some confounding, unseen variable is affecting changes in the dependent variable, and consequently they are said to demonstrate strong internal validity. Threats to internal validity include: (i) selection bias, (ii) history effect, (iii) maturation effect, (iv) testing effect, (v) instrumentation, (vi) experimental mortality/participant attrition, (vii) diffusion of treatment/contamination, (viii) compensatory behavior.¹¹</p> <p><u>Scoring:</u> 3: The study has an experimental design. The study describes efforts to address several potential sources of bias. Post-experimental analysis controls and addresses any remaining confounding factors, and alternative explanations of the results are discussed. Based on discussion, the study is likely to have strong internal validity. 2: The study has an experimental or quasi-experimental design. It describes efforts to address some potential sources of bias (e.g., the "threats to internal validity" noted above). Some confounding variables have been controlled, while others have not. Based on the discussion, the study is likely to have moderate internal validity. 1: The study has an observational design OR it has an experimental or quasi-experimental design but failed to address several of the threats to internal validity noted above, and is likely to have low internal validity.</p>	-
13. To what extent is the study externally valid?	<p><u>Description:</u> This describes the extent to which the findings of a study are likely to be replicable across multiple contexts (also referred to as <i>generalizability</i>). Do they apply only to the subjects investigated during this particular study, or are they likely to apply to a wider population/country group? Quantitative researchers typically seek to address issues of external validity by constructing representative samples (i.e., groups of subjects that are representative of a wider community/society). Research conducted with non-probability samples (purposive, quota, convenience) often used in qualitative research typically cannot make claims about generalizability (often not their goal), and therefore have low external validity.</p> <p><u>Scoring:</u> 3: The study population adequately represents a larger population. The study</p>	-

Question	Evidence quality review code book ^a	Ranking (1–3)
	Ranking guidelines	
	<p><i>intervention(s), procedures, and setting adequately represent “real world” conditions. Factors related to external validity are discussed and, it is likely that the findings would be replicated in other contexts.</i></p> <p><i>2: The study population is representative of a larger population, but the study intervention(s) and procedures only partially represent “real world” conditions. Factors related to external validity are discussed and it is possible that the findings would be replicated in a narrow range of other contexts.</i></p> <p><i>1: The study population is not representative of a larger population. It is unlikely or impossible to determine whether the findings would be replicated in another context.</i></p>	
14. To what extent is the study ecologically valid?	<p>Description: This dimension of validity relates to the degree to which any research is really able to capture or accurately represent the real world, and to do so without the research itself somehow affecting the subjects it seeks to study. Any time a researcher carries out an investigation in the field (asking questions, measuring something), s/he introduces something artificial into that context. Ecologically valid studies will explicitly consider how far the research findings may have been biased by the activity of doing research itself. Such consideration is sometimes referred to as “reflexivity.”</p> <p>Scoring:</p> <p><i>3: The study considers how the research activity itself may have biased the findings. The natural setting of the research was relatively undisturbed by the presence of the researchers/research activity and the events and results observed would have occurred without a researcher’s presence.¹ Alternatively, the study analyzed previously collected data and could not have impacted the study setting.</i></p> <p><i>2: The study considers how the research activity itself may have biased the findings and it is possible that the natural setting of the research may have been disturbed by the presence of the researchers/research and biased the findings. Alternatively, this is not considered in the study but the events and results observed were likely unbiased by the researcher’s presence.</i></p> <p><i>1: The study does not consider how the research activity itself may have biased the findings and/or the results observed would very likely not have occurred without a researcher’s presence.</i></p>	-
Total for Validity		/12
Average for Validity		-
<i>Reliability: “The repeatability of a particular set of research findings; that is, how accurately they would be replicated in a second identical piece of research”.^f</i>		
15. To what extent are the measures used in the study stable (inter-item reliability)?	<p>Description: Inter-item reliability means that the results produced by an indicator do not vary between respondents with the same characteristics and the results produced by an indicator do not vary over time within the same subject (assuming there is no actual change over time in the construct being measured). For example, if measuring intelligence of high school students, using the indicator of an IQ test would likely yield similar results for the same individual over time, while the indicator of grade point average could vary over time for the same student based on factors such as interest in the subject matter, teacher quality, whether they are playing a sport that semester, personal life events, etc.</p> <p>Scoring:</p> <p><i>3: Studies use reliable metrics (i.e., those less prone to variation between respondents with the same condition and/or over time). The study describes or shows data indicating that the stability of the indicators was verified through a test-retest method (i.e., re-administering the same indicator to the same subjects).¹ In addition the study has adjusted for any remaining impact of measurement error in the measures used.</i></p> <p><i>2: The study uses indicators that are reasonably reliable. Some actions taken by the researchers to ensure consistency of the metrics between respondents with the same characteristics and/or over time are discussed, but these may not be sufficient to ensure stability. The study has not adjusted for any remaining impact of measurement error in the measures used.</i></p> <p><i>1: The study uses unreliable metrics (i.e., those prone to variation between respondents with the same condition and/or over time) and does not discuss actions taken by the researchers to ensure consistency of these metrics. The study has not adjusted for the impact of measurement error in the measures used.</i></p>	
16. To what extent are the measures used in the study internally reliable (inter-rater reliability)?	<p>Description: Inter-rater reliability is how consistent are the results when different people apply a measure to the same subject. For example, if multiple interviewers conduct an interview with the same subject, will the responses be the same, or will some interviewers draw out different information based on the way they ask the questions? What steps, if any, have been taken to ensure that the researchers are consistent in the way they ask questions and gather data? Or if measuring waist circumference, will different data collectors measure the same individual’s waist in the same way (or might some leave slack in the tape measure while others pull it tight)? Similarly, if three weighing scales are being used to measure birth weight, do all three scales report the same weight for the same baby?</p> <p>Scoring:</p> <p><i>3: Quantitative studies use reliable metrics (i.e., those less prone to variation between</i></p>	

	<p>assessors, such as biomedical tests, or verified program or clinical records) and describes the actions taken to ensure the measurement results did not vary between assessors or different measurement instruments. These studies present data showing the reliability of the metrics and/or adjust for any remaining impacts of measurement error in the measures used. Qualitative studies use contextually appropriate measures and describe the actions taken by the researchers to ensure consistency in collecting data (such as limiting the number of interviewers, extensive training of interviewers, and/or using a scripted or semi-structured guide).</p> <p>2: Quantitative studies use reasonably reliable metrics but the actions taken by researchers to ensure the measurement results did not vary between assessors or different measurement instruments may not be sufficient (nor was adjustment done to eliminate measurement error). Qualitative studies use contextually appropriate measures, but the actions taken by the researchers to ensure consistency or reduce measurement error may not be sufficient.</p> <p>1: The study uses unreliable metrics (e.g., self-reporting, unstructured interviews) and does not describe any actions taken to ensure the measurement results did not vary between assessors or different measurement instruments. Data showing the reliability of the metrics indicate low reliability or is not presented.</p>	
<p>17. To what extent are the findings likely to be sensitive/changeable depending on the analytical technique used?</p>	<p>Description: The findings of a research study are open to question if the application of a different analytical technique (or "specification") to the same set of data produces dramatically different results. Sometimes researchers will present two approaches to analyze data and where there is agreement this lessens the likelihood that the results are variable based on the statistical technique or coder. For example, if studying effectiveness of hormonal birth control, are results for multiple thresholds (i.e., levels needed to suppress ovulation) reported, and do they both show the same result? Alternatively, if a study on medication adherence has a high rate of participant attrition, but the author presents sensitivity analyses that show the study outcomes if a) all participants lost to follow up were adherent, and b) all participants lost to follow up were non-adherent. If there is agreement in these models then it is unlikely that the loss to follow up affected the outcomes of the study.</p> <p>Scoring:</p> <p>3: The data analysis technique is appropriate to the data set and the author analyzes the data based on the original (a priori) analysis method/threshold. If another method/threshold was analyzed or sensitivity analysis was preformed, these techniques produce the same or very similar results to the a priori analysis. Qualitative studies provide inter-rater reliability statistics/description showing high levels of agreement between the coders in analysis.</p> <p>2: The data analysis technique is moderately appropriate to the data set. The study may have limitations such as differential loss to follow up or note alternative thresholds, but these were not tested for agreement, or the testing of an alternative method/threshold produces results with only moderate agreement to the a priori analysis. Qualitative studies provide inter-rater reliability statistics/description showing moderate agreement between coders.</p> <p>1: The data analysis technique is not appropriate to the data set, and/or the author analyzes the data based on the original (a priori) analysis method/threshold, along with another method/threshold and these techniques produce results that do not agree. Qualitative studies do not provide inter-rater reliability statistics/description, or these show weak agreement between coders.</p>	
<p>Total for Reliability</p>		/9
<p>Average for Reliability</p>		
<p>Cogency: A high-quality study will provide a clear, logical thread that runs through the entire paper. This will link the conceptual (theoretical) framework to the data and analysis, and, in turn, to the conclusions. High-quality studies will signpost the reader through the different sections of the paper, and avoid making claims in their conclusions that are not clearly backed up by the data and findings. High-quality studies will also be self-critical, identifying limitations of the work, or exploring alternative interpretations of the analysis.</p>		
<p>18. Does the author "signpost" the reader throughout?</p>	<p>Description: Signposting is the creation of a "road map" to the contents and findings of a study.^k "The idea behind signposting is that you include words or sentences which do not add anything substantial to the meaning of what you are trying to say, but instead help to guide the reader through your article."^l</p> <p>Scoring:</p> <p>3: There is a logical flow to the article and the concepts presented are well linked. The author uses subheadings and/or clear language to guide the reader through the article and all content falls within the relevant headings and subheadings.</p> <p>2: There is a logical flow to the article and most of the concepts presented are well linked with the rest of the article.</p> <p>1: The article is difficult to follow and many of the concepts are not clearly linked with rest of the article.</p>	
<p>19. To what extent does the author consider the study's limitations and/or alternative interpretations of the analysis?</p>	<p>Description: High-quality studies will reflect on the limitations of the study, including how, and to what extent, these may have influenced the results. They will also reflect on any possible alternative interpretations of the results.</p> <p>Scoring:</p> <p>3: The author considers several limitations to the design that take into account sources of potential bias or imprecision – including the direction and magnitude of any</p>	

Question	Evidence quality review code book ^a	Ranking (1–3)
	Ranking guidelines	
	<p><i>potential bias – and discusses alternative interpretations of the analysis.</i>^{c,d}</p> <p><i>2: The author notes possible limitations but does not describe the effect of the potential bias or discuss alternative interpretations of the analysis.</i></p> <p><i>1: The author does not consider any limitations of the study.</i></p>	
20. Are the conclusions clearly based on the study's results?	<p>Scoring: Conclusions describe the significance of the study, including its contribution to the body of knowledge, and should be firmly grounded in the study results.</p> <p><i>3: For each primary and secondary outcome, study results are clearly presented, including estimates of effect size, controlled variables, and precision (i.e., confidence intervals), where relevant. Conclusions are clearly and specifically based on study results.</i></p> <p><i>2: For each primary and secondary outcome, study results are clearly presented, but don't consistently include estimates of precision when needed. The conclusions are primarily based on study results, but also include ideas and information not supported by the results.</i></p> <p><i>1: The study results are not clearly presented and/or the conclusions are not well linked to the study results.</i></p>	
Total for Cogency		/9
Average for Cogency		
TOTAL SCORE FOR ALL DOMAINS		/21

^aThis codebook was adapted by Mandy Swann with extensive input from Emily Namey and Holly Burke (all with FHI 360). Text, including definitions, descriptions, and scoring, was extracted or adapted from DFID's *Assessing the Strength of Evidence*, and supplemented where necessary. DFID (2014).

^bMaxwell (2012).

^cvon Elm et al. (2008).

^dSchulz, Altman, and Moher (2010).

^eJohnson, Reynolds, and Mycoff (2015).

^fThe Association for Qualitative Research (n.d.).

^gNeuman (2006, pp. 259–260).

^hNeuman (2006, pp. 260–263).

ⁱNeuman (2006, pp. 264–267).

^jNeuman (2006, p. 189).

^kThompson (2011).

^lBecker and Denicolo (2012, p. 79).