Brown School Theses and Dissertations   Brown School

8-21-2024

Economic Behavior and HIV Risk Behavior Among Vulnerable Women: A Prospective Randomized Control Study in Southern Uganda

Joshua Kiyingi
Washington University in St. Louis - Brown School of Social Work, joshkiyingi@gmail.com

Follow this and additional works at: https://openscholarship.wustl.edu/brown_etds

Part of the Public Health Commons

Washington University in St. Louis

The Brown School

Public Health Sciences

Dissertation Examination Committee:

Fred M. Ssewamala, PhD, Chair

Mary McKay, PhD

Derek Brown, PhD

Ross Brownson, PhD

Proscovia Nabunya, PhD

Torsten Neilands, PhD

Economic Behavior and HIV Risk Behavior Among Vulnerable Women: A Prospective

Randomized Control Study in Southern Uganda

By

Joshua Kiyingi, MSTAT

A dissertation presented to the Brown School of Washington University in St. Louis in partial

fulfillment of the requirements for the degree of Doctor of Philosophy

August 2024

St. Louis, Missouri

Dedication

To Irene, Luella and Emryn Kiyingi

Acknowledgements

I am profoundly grateful to my doctoral chair, Prof. Fred Ssewamala. His encouragement to apply for the doctoral program and his unwavering support throughout my journey have been invaluable. His acceptance to be my advisor and his exemplary execution of this role have significantly contributed to my success. I am also thankful for the numerous opportunities he has provided me.

I would like to extend my sincere gratitude to my committee members: Dr. Mary McKay, Dr. Ross Brownson, Dr. Proscovia Nabunya, Dr. Derek Brown, and Dr. Torsten Neilands. Their critical yet constructive feedback has been instrumental in shaping my dissertation, and their guidance has been essential in structuring its various sections.

My appreciation also goes to the principal investigators of the Kyaterekera Study, Dr. Fred Ssewamala and Dr. Susan Witte, for granting me access to the study dataset for this dissertation. Additionally, I am grateful to the entire team at ICHAD for their diligent work in collecting and cleaning the dataset.

To my beloved family—my wife, Irene, and our wonderful children, Luella and Emryn—your unwavering support has given me the strength to persevere. Thank you for brightening my days and nights during challenging times. I am forever indebted to you. To my siblings, your moral and spiritual support has been deeply appreciated.

Table of Contents

List of Tables

List of Figures

Abstract

Economic Behavior and HIV Risk Behavior Among Vulnerable Women: A Prospective

Randomized Control Study in Southern Uganda

By

Joshua Kiyingi, MSTAT

Doctor of Philosophy in Public Health Sciences

The Brown School, Washington University in St. Louis, 2024

Professor Fred Ssewamala, Chair

In sub-Saharan Africa (SSA), the estimated population of women engaged in sex work (WESW) is 2.5 million, aged 15 to 49 years (Laga et al., 2023). WESW face numerous challenges, including high-risk behaviors that expose them to HIV, sexually transmitted infections (STIs), drug and alcohol abuse, criminalization, discrimination, mental health problems, and limited healthcare access. Globally, WESW are significantly affected by HIV, with new infections continuing to rise. Recent estimates show that although 8% of all new HIV infections are among WESW, 32.8% of them are unaware of their HIV status (UNAIDS, 2021a). The risk of acquiring HIV is 30 times higher for WESW compared to the general female population (Abdella et al., 2022; UNAIDS, 2021a).

Women resort to sex work for various reasons, with poverty being the most obvious. Poverty is a multidimensional phenomenon characterized by factors such as unemployment, low literacy levels, homelessness, morbidity, and social discrimination, all of which are related to WESW. Women in SSA, particularly those 25–34, are among the poorest globally, with 62.8% of all women in extreme poverty living in SSA. Despite increased access to education in SSA, there has been no significant change in the female labor force participation rate, which could

contribute to poverty reduction. Limited human capital among women in SSA puts them at a disadvantage in the job market compared to men, making them particularly susceptible to extreme poverty.

Most women in SSA in the working age bracket mainly participate in unpaid work, and those with paid jobs are often employed in sectors with lower financial benefits, typically part time. Given the risks sex work poses to women's health and their sexual partners, the economic empowerment of WESW is crucial for access and control over resources. Therefore, it is important to critically examine and assess economic behaviors in relation to WESW's HIV risk behavior. This dissertation aimed at examining the effect of an economic empowerment intervention on reducing HIV risk behavior among 542 WESW in southern Uganda. It had four aims: (a) examine the short and midterm efficacy of economic empowerment intervention on the HIV risk behavior of WESW; (b) examine the patterns of savings in relation to WESW's expenditure and HIV status (positive and negative) among WESW; (c) examine the association between savings, savings expectations, and access to savings institutions among WESW in relation to their HIV status; and (d) Examine the cost and cost-effectiveness of HIV risk behavior change among WESW in Uganda. HIV risk behavior included condomless sex and sex under the influence of drugs and alcohol.

Data from three waves of the Kyaterekera study were analyzed. This longitudinal randomized controlled trial assessed the impact of adding economic empowerment to traditional HIV risk reduction methods in reducing new HIV and STI cases among vulnerable women in Uganda. The study enrolled 542 women aged 18–58 years from 19 hotspots in southern Uganda, randomizing them into a control group receiving HIV risk reduction (HIVRR) only and a treatment group receiving HIVRR plus a savings account and FLT (HIVRR+S+FLT).

A multilevel mixed-effects model was employed to assess the economic empowerment intervention's effect on HIV risk behavior. The results did not show a significant reduction in HIV risk behavior among WESW. However, there was a nonstatistically significant reduction in HIV risk behavior at 6 months for those who received the economic empowerment intervention compared to the HIVRR-only group. This pattern persisted when women were grouped by HIV status (positive or negative). Analyzing savings and expenditure patterns among WESW by HIV status revealed that HIV-negative women had consistently higher net savings over time compared to HIV-positive women. Multilevel linear regression models indicated that savings expectations were a significant predictor of increased savings among HIV-negative WESW. The total cost of the intervention was $58,675.70 for the control group and $507,714.69 for the treatment group. The per participant costs using the "treatment on treated" method were $323 for the control group and $1435 for the treatment group. However, the intervention was found to be strictly dominated and not cost-effective.

These findings suggest that economic empowerment interventions may not effectively reduce HIV risk behavior among WESW in the short term. Considering longer intervention periods could be beneficial. Additionally, enhancing women's social support could increase their savings. Incorporating financial support into care programs for HIV-positive women could reduce their expenditure, leading to increased savings and potentially reducing HIV risk behaviors.

Chapter 1: Introduction

Background

Sex work is defined as the trading of sexual services (oral, vaginal, and anal) for money, goods, and other services (Freeman, 2019) or the exchange of sexual labor for money and other services or material (Orchard, 2020). Sex work involves humans of all genders, sexual orientations, ages, and races (Orchard, 2020). Globally, the population of women engaged in sex work (WESW) is not well documented. In sub-Saharan Africa (SSA) it is estimated at 2.5 million aged 15–49 (Laga et al., 2023). These numbers may be an underestimation given that in many countries in SSA sex work is considered illegal.

Women engage in sex work both voluntarily and involuntarily (Gallegos, 2023; UNESCO, 2002). Voluntary engagement in sex work is mainly due to different reasons, including economic crises, poverty, family pressure, and others. Involuntary engagement includes young women forced into sex work through human trafficking, kidnapping, and coercion(Gallegos, 2023). Involuntary engagement also includes women who have been deceived and enticed into the trade by their friends or other individuals (Shahid et al., 2013).

WESW are faced with several challenges. These include the high risk behaviors that expose them to HIV, sexually transmitted infections (STIs), drug and alcohol abuse, criminalization, discrimination, mental health problems, and limited access to health care (Ali et al., 2022; Beksinska et al., 2022; Jaffer et al., 2022; Kassanjee et al., 2022; B. S. West et al., 2022; Yeo et al., 2022). Globally, WESW are a key population affected by HI,V and new HIV infections continue to rise among this population (Abdella et al., 2022a; Chen et al., 2022). Recent estimates indicate that although 8% of all new HIV infections were among WESW, 32.8% of WESW are not aware of their HIV status (UNAIDS, 2021a). Moreover, the risk of

acquiring HIV is 30 times higher for WESW compared to the general female population (Abdella et al., 2022a; UNAIDS, 2021b). The HIV prevalence among WESW varies by country and region. Whereas 1 in 5 WESW in SSA is estimated to have HIV (Laga et al., 2023), this figure varies by region. In West and Central Africa, WESW have 30 times higher risk of acquiring HIV compared to the general population, and 19% of all newly infected persons are WESW (Bitty-Anderson et al., 2022). In South Africa, the prevalence of HIV among WESW is estimated at 62%, and they comprise 5% of all new infections (Africa et al., 2022). In East Africa, HIV estimates for WESW stand at 10.8% (Mulholland et al., 2021).

In Uganda, WESW have a higher HIV prevalence (37%) compared to the general female population (6.8%), and 18% of all new infections are attributed to this key population (Arinaitwe et al., 2023; Ministry of Health Uganda, 2022). WESW facilitate the transmission of HIV to the general population through their clients who pass it on to their sexual partners, including spouses (Benner, 2022).

Women to resort to sex work for many reasons; the most cited are economic in nature, dominated by poverty (Mgbako, 2019; Social Problems, 2016). Poverty is a multidimensional phenomenon characterized by factors such as lack of income due to unemployment, a lack of or lower literacy levels, homelessness, morbidity, and social discrimination and exclusion, and all these factors are related to WESW (Olarewaju & Olarewaju, 2020). Women in SSA are ranked among the poorest across all the continents in the world, specifically those aged 25–34 (World Bank, 2020). Globally, of all women in extreme poverty, 62.8% live in SSA (Azcona & Bhatt, 2022). Despite an increase in access to education for women in SSA, which is mainly attributed to female empowerment, there has been no significant change in the female labor force participation rate, which could contribute to poverty reduction (Backhaus & Loichinger, 2022;

Balasubramanian & Kuppusamy, 2021). Women in SSA are particularly susceptible to extreme poverty primarily due to their limited human capital, which puts them at a disadvantage in the job market compared to men (Yacob-Haliso & Falola, 2021). Most women in SSA in the working age bracket (15–65 years), in which most of the WESW fall, mainly participate in unpaid work (Laga et al., 2023). Those who do paid jobs are employed in sectors with lower average financial benefits and more part-time jobs (Yacob-Haliso & Falola, 2021).

One effective approach to alleviating poverty among women is to invest in income-generating activities via several methods, one being incentivized savings. This strategy not only fosters economic growth at the individual, household, and national levels through asset accumulation but also capitalizes on the tendency of women to save more than men (Buvinic & Jaluka, 2018; Loaba, 2022). Accumulating assets through savings is a learned behavior that develops over time. Savings serve as a means to mobilize resources, allowing for potential investments to generate income. Possessing assets not only correlates with good health but also enhances the social status of women in their homes and communities (van der Meulen Rodgers & Kassens, 2018). Women who possess assets are more likely to access and use health services, including contraceptives such as condoms. This proactive approach contributes to reducing the risk of acquiring HIV (Yaya et al., 2020). However, with a low labor force participation rate and unpaid and part-time work, women in SSA lack income and incentives to save and grow their asset portfolio.Moreover, women in SSA are burdened with family responsibilities that take almost all their meagre earned income. They have less decision-making power in household savings and investments (Buvinic & Jaluka, 2018). Low or no savings and lack of assets hinder women from accessing both informal and formal credit because they have no collateral to back their credit requirements. Additionally, they lack awareness of the documentation and other

prerequisites necessary for accessing credit and financial services in both formal and informal financial institutions. Furthermore, WESW aged 5–49 years often have limited savings or are just commencing their savings journey, as described by Franco Modigliani's life cycle hypothesis (Ando & Modigliani, 1963). Low levels of education among women in SSA limit their employable skills and knowledge, resulting in restricted employment opportunities in both formal and informal sectors. Consequently, many women in SSA turn to sex work. The interconnected nature of education attainment, employment rates, and income disparity aligns with the human capital hypothesis. According to this hypothesis, higher levels of education enhance individual productivity, thereby contributing to increased earnings (Qin, 2023).

Sex work is risky in regard to women's health and sexual partners. Against that backdrop, WESW's economic empowerment is crucial regarding access and control over resources. Therefore, it is important to critically examine and assess economic behaviors in relation to WESW's HIV status. In this dissertation, I hypothesize that WESW's economic empowerment reduces their dependence on income from sex work and reduces their HIV risk behavior, including condomless sex and sex under the influence of alcohol and drugs, which lowers their risk of acquiring HIV.

Applying three complimentary theories—sociocognitive, asset, and human capital, which have been used extensively in studying and understanding behavioral change, and using data from a 5-year (2018–2023, with a 1-year no cost extension) National Institute of Mental Health-funded study titled Kyaterekera (R01MH116768, MPIs: Fred Ssewamala and Susan Witte), this dissertation focuses on economic empowerment as a strategy of reducing poverty (the lead driver of women to sex work) among WESW in relation to their HIV status. Kyaterekera is a longitudinal study implemented in southern Uganda addressing sexual risk-taking behaviors

among vulnerable women by combining the traditional HIV risk reduction methods with an economic empowerment intervention. The Kyaterekera study collected data over a period of 5 years (September 2018 to December 2023). Data were collected at five data points: baseline, 6, 12, 18 and 24-month follow up. Kyaterekera study is registered with the U.S. National Library of Medicine (Ssewamala, 2024).

The Kyaterekera study dataset (Years 2018 to 2023) is a longitudinal dataset that includes a wide array of constructs related to WESW. The dataset contains demographic data such as age, marital status, and religion. It also includes community-level data, such as the name of the village where the participant lives, duration of residence in the village, access to medical facilities, commercial banks, and clean water, as well as community satisfaction.

In terms of economic-related data, the Kyaterekera study captures actual savings data from financial institutions for WESW in the intervention group, tracked from their bank statements, along with self-reported data on average monthly household income, average monthly income from sex work, and amount of money saved. The dataset also assesses women's interest in saving and saving expectations, access to saving institutions, financial distress, financial self-efficacy, delay discounting, information salience, economic utility, and loss aversion. Additionally, the dataset includes financial expenditure data, tracking women's financial expenditures through financial diaries to examine their savings vis-a-vis their financial expenditures. It also encompasses employment data, including formal and informal employment data concerning WESW, and assesses the ease with which WESW can secure employment in their communities.

Health/HIV-related data in the dataset include both self-reported HIV status (positive or negative) of women at all five data collection points and biomarkers from HIV tests conducted

by study medical personnel at baseline, 18-month, and 24-month follow-up data points. The dataset also includes viral load results for HIV-positive participants and biomarkers for STIs such as Neisseria gonorrhoeae and Chlamydia trachomatis. Additionally, it includes data on adherence to HIV medication, preexposure prophylaxis (PrEP) use and enrollment, mental health, personal health, access to medical care, and barriers to medical care.

Human capital/education-related data in the Kyaterekera study dataset contain information on education levels attained by women and capture the number of financial literacy sessions attended by each woman in the intervention group. Family-related variables include data on family relations and cohesion, social support, and non-kin-support networks.

Furthermore, the dataset includes variables on gender relations, with participants asked about their perceptions of gender roles in their communities. It also contains data related to the socioeconomic status of the family, including poverty indicators, employment status of women, and household finances, such as average monthly income, monthly income from sex work, amount in debts, and reasons for borrowing.

Sexual behavior-related variables include data on sex work survival and stigma, condom self-efficacy, and condom use communication self-efficacy with sexual partners. The dataset also includes a behavior survey, which encompasses variables on alcohol use, drug use, needle sharing behaviors, and arrest information. Last, women-abuse-related variables include data on domestic violence, intimate partner violence, and childhood sexual abuse.

Purpose, Research Aims, Questions, and Hypotheses

This section describes the research purpose, aims, questions, and hypotheses that guided this dissertation. The research questions rooted in the sociocognitive, asset, and human capital theories detailed in Chapter 2. These three theories have been applied widely in studying

behavioral change and economic behaviors in SSA among general and key populations. Table 1 presents a summary of some selected studies that have used sociocognitive asset and human capital theories in studying behavioral change, highlighting both the distinctions and similarities in relation to this dissertation.

The sociocognitive theory posits that learning occurs in a social context, characterized by a dynamic and reciprocal interaction among the individual, the environment, and behavior. This theory elucidates how personal experiences, the actions of others towards one's experiences, and environmental factors influence individual health behaviors (Bandura, 1997). Widely applied in the field of behavioral health, the sociocognitive theory has shown global relevance.

Sebastian et al. (2021) investigated the impact of the sociocognitive theory on dietary habits and physical fitness. They explored the associations between various domains of sociocognitive theory, such as self-regulation, social support, and outcome expectancy, and their effects on the physical abilities and dietary behaviors of individuals with type 2 diabetes. The findings revealed significant correlations between these domains and both physical activity and dietary behavior, highlighting the potential of sociocognitive theory-based interventions in promoting healthier behaviors (Sebastian et al., 2021).

Similarly, Mahdizadeh et al. (2021) applied the sociocognitive theory to investigate factors associated with the occurrence of nosocomial infections among medical personnel. The study conceptualized the relevant domains of the theory, namely self-regulation, outcome expectations, and barrier constructs, and applied structural equation modeling for analysis. The findings demonstrated that all three domains directly influenced the occurrence of nosocomial infections as a behavioral outcome (Mahdizadeh et al., 2021).

Oyibo et al. (2018) assessed the determinants of bodyweight exercise behavior (specifically pushups and squats) using fitness apps and a virtual coach, applying sociocognitive theory. The study revealed that self-efficacy, sociosupport, and outcome expectation—domains of sociocognitive theory—significantly influenced behavior. These findings prompted the development of guidelines for designing virtual applications to promote regular physical activitiesClick or tap here to enter text..

Tao et al. (2022) examined the relationship between HIV-related stigma and HIV self-management. They found that social support and self-efficacy, constructs embedded in social cognitive theory, mediated the relationship between HIV-related stigma and HIV self-management as a behavior among men who have sex with men. In this dissertation, I consider the three domains of the sociocognitive theory—building self-efficacy, outcome expectancies, and social support.

Asset theory posits that economic asset accumulation may result in economic stability, sustainable psychological behavior, and other social benefits (Sherraden, 1991). People who have access to resources, such as accumulated savings and assets, are more likely to create and pursue opportunities that would otherwise be unavailable to them due to a lack of the same. They are more likely to be strategic and take a long-term view in their decision-making and planning in terms of investments, thus creating recurring income. This increases their control over resources, which comes with confidence, good health decision-making, and self-efficacy. Assets are accumulated through personal savings, often influenced by favorable institutional mechanisms such as policies. Sherraden and colleagues (Sherraden, 1991, Sherraden et al., 2003; Yadama & Sherraden, 1996). advanced five constructs considered to increase savings: access to savings institutions, information, incentives, facilitation, and expectations. WESW in low-

resource settings have challenges in accessing savings institutions due to a lack of information and financial literacy, which reduces their ability to save and builds assets and keeps them in extreme poverty. In this dissertation, I apply asset theory constructs to explore the changes in savings among WESW in an economic empowerment intervention over time and how this affected their HIV status.

Human capital theory, introduced by Gary Becker and Theodore Schultz in the 1950s and early 1960s, suggests that an individual's level of education and vocational training impacts their earnings throughout their life (Gao et al., 2011). This theory posits that human capital, encompassing an individual's skills and knowledge, enhances performance of various tasks, albeit to varying degrees depending on the task, organization, and context. It argues that as an individual's education level increases, so does their productivity and income.

Gao et al. (2011) applied human capital theory to understand the differences in wages and employment outcomes among individuals with mental challenges. They found higher levels of education and longer periods of employment were associated with higher wages among individuals with mental health challenges. In SSA, women are typically less educated than men, leading to lower competitiveness in the job market. Therefore, this dissertation examines the education levels of women as a predictor of increased savings among WESW.

This dissertation tests whether economic empowerment intervention—guided by asset theory—coupled with HIV risk reduction workshops—guided by sociocognitive theory, impacted WESW's economic behavior (which included changes in their savings and saving behaviors) and their HIV risk behavior. The dissertation also examines the correlates of economic behaviors among WESW. Moreover, to begin to address the question of sustainability and scaling of interventions aimed at addressing the economic instability of WESW and their

HIV risk behavior, the dissertation also addresses the cost-effectiveness question by assessing the cost-effectiveness of achieving a change in HIV risk behavior by an economic empowerment intervention. Cost-effectiveness helps public health practitioners and policymakers to implement evidence-based public health programs and policies when adopting or scaling up evidence-based public health interventions. To accomplish this, the dissertation addresses the following aims using data from the National Institute of Mental Health-funded Kyaterekera study (Ssewamala et al., 2019). Details of the Kyaterekera study are presented in Chapter 3.

<div align="center">**Research Questions and Hypotheses**</div>

Study Aim 1a

Aim 1a: Examine the short and midterm efficacy of economic empowerment intervention on the HIV risk behavior of WESW.

Research Question 1: What is the short and midterm efficacy of economic empowerment intervention on the HIV risk behavior of WESW?

Ha: There is a reduction in HIV risk behavior for WESW in the intervention condition compared to those in the control between baseline and 12-month follow up.

Study Aim 1b

Research question: What is the short and midterm differential efficacy of the economic empowerment intervention on the HIV risk behavior of WESW by HIV status (positive and negative).

Ha: There is a reduction in HIV risk behavior among HIV-negative WESW compared to those who are HIV-positive between baseline and 12-month follow up.

Study Aim 2

Study Aim 2: Examine the patterns of savings in relation to WESW's expenditure and HIV status (positive and negative) among WESW.

Research Question 1: Does growth in savings reduce expenditures among HIV-negative women engaged in sex?

Ha1: Increased savings are associated with reduced expenditure among HIV-negative WESW compared to those who are HIV-positive.

Study Aims 1a, 1b, and 2 and their corresponding research question and hypotheses are guided by asset theory, sociocognitive theory, and human capital theory.

Study Aim 3

Study Aim 3: Examine the association between savings, savings expectations, and access to savings institutions among WESW in relation to their HIV status.

Research Question: Do saving expectations (saving goals) and access to saving institutions have an impact on WESW's savings growth and HIV status (positive and negative)?

Study Aim 4

Study Aim 4: Examine the cost and cost-effectiveness of HIV risk behavior change among WESW in Uganda.

Research Question 1: What is the cost of implementing an economic empowerment intervention among WESW in southern Uganda?

Research Question 2: What is the cost-effectiveness of a change in HIV risk behavior among WESW in southern Uganda? This question seek to explore the cost associated with inducing a shift in HIV risk behavior through an economic empowerment intervention.

Study Aims 3 and 4 of the study are exploratory in nature, and as such, they do not adhere to any specific guiding theory.

<h3 style="text-align:center">Significance of the Dissertation</h3>

HIV/AIDS remains a global challenge, with more than 27.5 million people living with HIV and over 1.5 million new cases registered globally in 2021 (UNAIDS, 2021b). WESW have been documented among key populations in spreading HIV due to their work (Platteau et al., 2022). The global HIV prevalence among WESW varies by country and region; however, UNAIDS estimates that 8% of all new HIV infections in 2020 were reported among WESW and 32.8% of WESW were not aware of their HIV status (UNAIDS, 2021a). The high prevalence of HIV among WESW makes it difficult to prevent the virus among people in heterosexual relationships (Abdella et al., 2022b). WESW are a top priority population in the fight against HIV worldwide. The high burden and incidence of HIV among WESW makes them a substantial vector for HIV transmission (Platteau et al., 2022). According to UNAIDS (2021a), in 2019 WESW had a 26 times greater risk of acquiring HIV than the general female population.

Poverty is the leading driver of sex work among women (Boroumandfar et al., 2022; Gore & Patwardhan, 2022). According to the World Bank (2020), worldwide poverty levels were estimated between 9.1%–9.4% in 2020 and 8.9–9.4% in 2021, and women are among the poorest across all the continents in the world, specifically those aged between 25 and 34 o(World Bank, 2020). Moreover, this age group is at risk of being driven into sex work (Boroumandfar et al., 2022; Gore & Patwardhan, 2022; Platteau et al., 2022). Poverty is the deprivation of basic needs that a person requires for living, resulting from a lack of income, assets, skills, knowledge, and technology (Alqassim & El-Setouhy, 2022). Poor people survive on less than $1.90 a day (Olarewaju & Olarewaju, 2020).

Scholars are exploring several ways of addressing poverty and other drivers of sex work among women and focusing on prevention and reducing the HIV burden. These scholars are primarily focused on behavioral interventions, such as promoting condom use and assessing the effectiveness and adoption of PrEP and postexposure prophylaxis (PEP). However, it is challenging for WESW to solely rely on behavioral health interventions without addressing the underlying factors pushing them into sex work, particularly poverty.

Economic behavior has a significant bearing on WESW lives. Therefore, understanding and addressing economic factors and patterns faced by WESW can address the key driver of sex work and behavioral challenges they face. Studies focused on the economic empowerment of WESW in other parts of the world have reported positive outcomes, including a reduction in dependence on income from sex work, a drop in the number of sex partners, increased condom use, and quitting sex work (Odek et al., 2009; Mantsios et al., 2018; Witte et al., 2015). However, none have focused on the changes in economic behaviors in relation to HIV reduction among WESW. Economic behavior refers to the decisions, actions, and reactions made by individuals, groups, and institutions in response to economic incentives and disincentives. It includes both rational and irrational decisions, as well as choices based on individual and group values, beliefs, and preferences. Economic behavior is shaped by factors such as the economic system, the availability of resources, and the incentives and disincentives offered by governments and societies. This dissertation focuses on self-reported savings and reported expenditure patterns of WESW in relation to their HIV risk behavior, which includes condomless sex and sex under the influence of alcohol and drugs. Both saving and expenditure, as economic behavior, are driven by availability of resources, incentives, and disincentives. Saving is a learned behavior that plays a pivotal role in economic behavior. Over time, this behavior results

in the accumulation of savings, which can be translated into assets through investments, ultimately providing long-term control over resources.

Innovation

This dissertation brings two major innovations in studying economic behavior and HIV among WESW. First, it combines HIV risk behavior outcomes with an economic empowerment component. Most studies targeting WESW have largely focused on behavioral change to address the high prevalence of HIV among WESW, including condom use, adherence to medication, and HIV prevention methods (PEP and PrEP use) (Atuhaire et al., 2021; Chemaitelly et al., 2022; McGowan et al., 2022; Morin et al., 2021; Nyato et al., 2019; Olawore et al., 2020). Other selected studies are shown in Table 1. This dissertation examines WESW's HIV risk behavior in relation to their economic behavior following an economic empowerment intervention. The results of this dissertation may have a bearing on the public health policy and program shift in addressing the HIV prevalence among WESW in SSA. Second, it examines the cost-effectiveness of achieving a change in the HIV risk behavior among WESW as a result of an economic empowerment intervention. The cost-effectiveness of the outcomes is fundamental in the replication and scaling up of the intervention by other public health scholars, programmers and policy makers. The results may help policymakers and programmers develop effective policies and programs addressing the challenges faced by WESW. Moreover, few economic interventions exist; therefore, this dissertation may address part of this challenge (Musuuza et al., 2014; Panzer et al., 2020). Moreover, by this writing, through literature search I have not come across any research study about WESW in SSA that applied cost-effectiveness in their approach.

Table 1

Study Innovation Compared to Other Studies

Studies	Their innovation/uniqueness	My innovation/uniqueness
"Impact of 5 Years of Peer-Mediated Interventions on Sexual Behavior and Sexually Transmitted Infections Among Female Sex Workers in Mombasa, Kenya" (Luchters et al., 2008)	Peer-mediated interventions: distributing information, education and communication materials and condoms, and for voluntary counselling and testing services	Economic empowerment intervention and cost-effectiveness of the impact of the intervention on HIV risk behavior
"Empowering Young Sex Workers for Safer Sex in Dowa and Lilongwe Districts of Malawi" (Kalanda, 2010)	Education: distribution of information, education and communication materials using different media. These included short but moving talks and stories	Economic empowerment intervention and cost-effectiveness of the impact of the intervention on HIV risk behavior
"Effects of Microenterprise Services on HIV Risk Behaviour Among Female Sex Workers in Kenya's Urban Slums" (Odek et al., 2009)	Microenterprise services to a peer-mediated HIV/AIDs intervention	Cost-effectiveness of the impact of the intervention on HIV risk behavior

"'That's How We Help Each Other': Community Savings Groups, Economic Empowerment and HIV Risk Among Female Sex Workers in Iringa, Tanzania" (Mantsios et al., 2018)	Economic empowerment using community savings groups	Cost-effectiveness of the impact of the intervention on HIV risk behavior
"Project Shikamana: Community Empowerment-Based Combination HIV Prevention Significantly Impacts HIV Incidence and Care Continuum Outcomes Among Female Sex Workers in Iringa, Tanzania" (Kerrigan et al., 2019)	Community-led drop-in center and mobilization activities; venue-based peer education, condom distribution, and HIV testing; peer service navigation; provider sensitivity trainings; and SMS reminders.	Economic empowerment intervention and cost-effectiveness of the impact of the intervention on HIV risk behavior

Chapter 2: Theoretical Framework

The association between economic behavior and HIV risk behavior among WESW is guided by a conceptual framework (Figure 3) drawn from three behavioral change theories: the sociocognitive theory, asset theory, and human capital theory.

Sociocognitive Theory

Sociocognitive theory was developed by Albert Bandura as a social learning theory and later revised into social cognitive theory in 1986. The theory posits that learning occurs in a social context with a dynamic and reciprocal interaction of the person, environment, and behavior. It details a person's experiences, the action of others toward one's experience and environmental factors on individual health behaviors. The theory is applied to build self-efficacy and outcome expectancies through social support. To understand the sociocognitive theory, we must explore the six components that make it up: self-efficacy, behavioral capacity, expectations, self-control, observational learning, and reinforcement as shown in Table 2.

Table 2

Components of Sociocognitive Theory

Component	Explanation
Self-efficacy	A person's ability and confidence to execute a behavior. In other words, the control a person has to perform a given behavior
Behavioral capacity	A person's ability to understand and gain skills to execute a given behavior
Expectation	Health or nonhealth-related outcomes after a person has executed a given behavior
Self-control	A person's ability to control or regulate a given behavior.
Observational learning	Observing others executing a behavior and replicating; completing a behavior by watching or following others model it
Reinforcement	External or internal responses that determine a person's continuity or discontinuity of engaging in a given behavior. These are in terms of incentives geared towards encouraging behavior change.

Sociocognitive theory has been applied widely in studies and interventions that focus on addressing sexual risk-taking behaviors to reduce HIV among key populations, including WESW (see Table 1). Studies focusing on HIV reduction have found that self-efficacy is critical in determining whether a person changes their behavior or the time they invest in working on the change and maintenance of the behavior in the future (Albert, 1997).

This dissertation uses data from the Kyaterekera study. The Kyaterekera study interventions considered all the components of the sociocognitive theory through workshops, which included HIV risk reduction (HIVRR) and an economic empowerment intervention, financial literacy training (FLT) plus matched savings accounts (MSA). Through financial literacy workshops, women can gain knowledge in saving and starting up small enterprises, which might supplement or reduce their income from sex work. With the savings account provided by the Kyaterekera study, women's deposits were matched at a rate of 1:1 with a cap of ~$15 per month for 10 months (Ssewamala et al., 2019). The women could apply the knowledge gained from the FLT session to save and start small businesses. The matching was a booster for women to increase their savings, thus building their savings interests over time. There could be group building among women brought by observational learning since the workshops were delivered in groups, and women shared their success stories during the sessions. The HIVRR sessions could increase their skills to reduce the risk of HIV because they covered topics like (a) supporting healthy behaviors, (b) ways to reduce risk from HIV and STIs, (c) strengthening skills to keep safe and healthy, (d) reducing violence and planning a safer future. Combining economic empowerment and HIVRR could boost women's self-confidence and self-esteem and, thus, their self-efficacy.

Sociocognitive theory has shortcomings: it tends not to focus on an individual's inner traits and states and concentrates much on the situation. Personal characteristics can predict behavior because unconscious motives can outweigh the situation and, therefore, should not be downplayed. The theory is based much on the cognition. It does not consider biological and hormonal influences, which are proven to affect decision-making, notwithstanding their history and cognition (Carillo, 2010). The shortcomings of sociocognitive theory are addressed in this dissertation by including proxy variables to represent women's personal characteristics and biological influences in the model.

Asset Theory

Advanced by Sherraden (1991), asset theory posits that economic asset accumulation may result in financial stability, sustainable psychological behavior, and other social benefits. Sherraden argued that households and communities can develop by increasing savings and accumulating assets but not income alone. His definition of assets includes property and financial holdings. He advanced the idea of individual development accounts (IDAs) with MSAs, which have been implemented successfully in many parts of the world (El-Bassel et al., 2021; Mergenova et al., 2019; Ssewamala et al., 2018, 2022; Yang et al., 2021). The savings and matched savings can be used for education advancements or business acquisition/building. When people own resources, they may become more motivated and confident in their ability to make decisions and take action. Owning resources can also give people a sense of security and control over their lives, which can lead to increased self-efficacy, an increase in risk-taking, and innovative behavior, as people feel more confident that they can achieve their goals. Moreover, possessing resources can instill a heightened sense of responsibility, as individuals often feel compelled to use their assets for personal and communal benefit. Ownership of resources may

enhance one's perceived capability and competence in society, resulting in increased respect and admiration, accompanied by an elevation in social status. Furthermore, resource owners are frequently viewed as more generous and philanthropic, as they are better positioned to leverage their assets for the betterment of others. This fosters greater trust and respect from the community and can open up enhanced opportunities for these individuals.

Individuals can amass assets through various means, including using financial institutions like commercial banks and microfinance organizations to save funds in a bank account or other savings instruments, engaging in real estate investments, and initiating or acquiring businesses. Furthermore, people can bolster their assets through inheritance, receiving gifts, or benefiting from unexpected financial windfalls. Additional strategies for asset accumulation encompass diversifying investment portfolios, leveraging tax advantages, and harnessing the power of compound interest.

The Kyaterekera study applied the same idea of asset building among WESW by introducing incentivized saving—via a MSAs intervention for the participants in the treatment group, specifically using IDAs. Working with already established commercial banks in the study region (southwestern Uganda), which are regulated by the Bank of Uganda (Uganda's central bank), the Kyaterekera study opened IDAs for women randomized in the treatment arm. The IDAs were matched at a rate of 1:1 for 10 months, with a monthly matched cap of ~$15 (Ssewamala et al., 2019). Women were not restricted to using their savings and matches but were encouraged to use it for investments only to accumulate assets (Ssewamala et al., 2019). With asset accumulation comes life satisfaction because an individual has control of recourses (Yadama & Sherraden, 1996). Asset accumulation has also shown a negative effect on some

sexual risk-taking behaviors, such as alcohol abuse and mental illness (depression), which are some of the challenges faced by WESW (Rohe & Stegman, 1994; Yadama & Sherraden, 1996).

Research has shown that asset ownership positively correlates with good health (Ssewamala et al., 2009). It increases self-direction and optimism about the future and intellectual flexibility. Asset accumulation among women is associated with increased social status in their homes and societies and uptake and use of contraceptives (Grinstein-Weiss et al., 2005; Noponen, 1992; Schuler & Hashemi, 1994). With low rates of contraceptive use among WESW in SSA (lower than 40%), asset accumulation could help in the uptake of contraceptives and reduction of unwanted pregnancies, which stands at 61.6% (Chanda et al., 2017; Twizelimana & Muula, 2021). Asset ownership among women also decreases intimate partner violence (Grinstein-Weiss et al., 2005; Levinson, 1989; Page-Adams, 1995; Schuler & Hashemi, 1994). Intimate partner violence is one of the enormous challenges faced by WESW and one of the correlates of the high burden of STIs (Jennings Mayo-Wilson et al., 2022).

Accumulating assets is achievable through the practice of saving, a behavior acquired over time that results in the gradual accumulation of money. Without an interest in saving and financial self-efficacy, less can be achieved in terms of savings. Five constructs facilitate saving behavior (Sherraden et al., 2003): (a) access to savings institutions, (b) information, (c) incentives, (d) facilitation and (e) expectations (see Figure 1 and Table 3; Grinstein-Weiss et al., 2005; Sherraden et al., 2003).

Asset Theory Constructs

Access

Access pertains to policies and institutional frameworks designed to facilitate convenient depositing of savings into financial institutions. These institutions include various depositary

entities like commercial banks and various electronic deposit technologies, including mobile money deposits and banking applications on smartphones. Access to these technologies and the convenience of using money depositing institutions, such as banks, increases the likelihood of a bank more likely to accumulating higher savings compared to those without such accessibility (Pazarbasioglu et al., 2020).

Understanding

Understanding is crucial for fostering increased savings. Individuals possessing a solid understanding of the processes and positive outcomes associated with savings are more likely to maintain higher savings rates compared to those lacking such knowledge. This valuable information can be acquired through FLT programs offered by institutions like banks and civil society organizations. To initiate and sustain a savings culture, individuals require knowledge covering several areas of banking and saving (Lusardi & Mitchell, 2014).

- Financial awareness: Understand basic financial concepts such as budgeting, interest rates, and the power of compounding.

- Setting financial goals: Define short-term and long-term financial goals to give purpose to the customer's savings efforts.

- Emergency fund: Prioritize building an emergency fund to cover unexpected expenses and financial setbacks.

- Budgeting: Create a realistic budget that allocates a portion of your income to savings.

- Savings account: Open a savings account with a reputable financial institution that offers competitive interest rates.

- Deposits and automatic transfers: Set up reminders for regular deposits through the bank or mobile phone or automatic transfers to your savings account to ensure consistency.

Incentives

Financial institutions implement mechanisms to encourage customers to maintain and boost their savings such as higher interest rates on savings, matched savings programs, and rewards such as bonus points or gifts for reaching or exceeding savings targets. With these incentives in place, individuals are more inclined to adopt a positive attitude toward saving (J. S. H. Wang et al., 2018).

Facilitation

The degree to which an institution facilitates customers in making deposits is a critical aspect of how individuals learn savings behaviors. This institutional arrangement can include setting up automatic deposits from other accounts into their savings account. This feature is often a prominent characteristic of contractual saving systems (Sherraden et al., 2003).

Expectations

Customers and financial institutions can establish specific or anticipated savings goals. Individuals with elevated savings expectations are more inclined to save a greater amount compared to those without such aspirations (Grinstein-Weiss et al., 2005; Sherraden et al., 2003).

Figure 1

Asset Theory
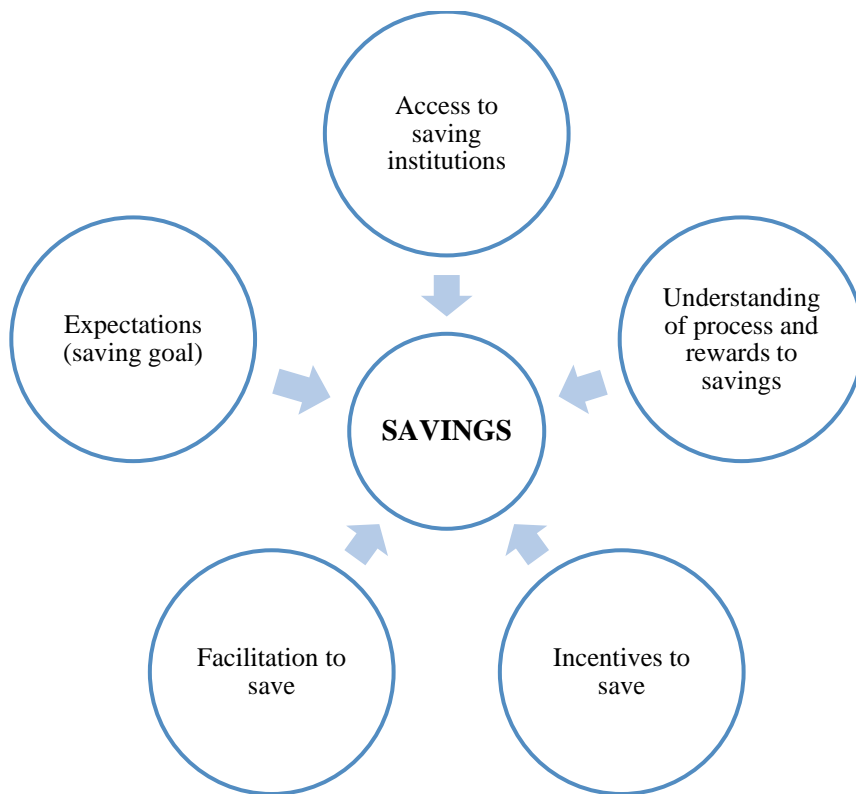
Table 3

Components of Asset Theory

Component	Explanation
Access	Institutional mechanisms that facilitate and streamline the savings process for participants. In the Kyaterekera study, availability of depositing institutions at community level and the distance to the nearest commercial bank were assessed. Although other mechanisms for depositing money in banks exist in Uganda, such as mobile money deposits using smartphones and the presence of bank agents in communities, these specific methods were not used in the Kyaterekera study and may not have been popularized at the time of study initiation.
Information	Information provided to participants to facilitate their savings. For the Kyaterekera study, six FLT sessions were provided to women in the intervention group. The sessions covered bank services, savings, budgeting, making a budget, debt management and increasing savings, and saving for emergencies. The measure of information for this study was the number of FLT sessions attended by the study participants in the intervention group.
Incentives	Incentives implemented by the Kyaterekera study intervention were aimed at encouraging participants to boost their savings. Specifically, participant savings in the intervention group were matched at a rate of 1:1 for a period of 10 months with a matching cap of ~$15. However, the incentives did not vary and therefore were not used in this dissertation.
Facilitation	Institutional arrangement for making participants deposits. The Kyaterekera study in conjunction with the partnering banks facilitated the opening of savings accounts and making initial deposits for the participants. However, this arrangement did not vary because it was done for all participants in the intervention group, and therefore it was not used in this dissertation.
Expectations	Amount of savings the program expected of the participants in a given period of time. For the Kyaterekera study, participants were expected to deposit at least $15 every month for a period of 10 months from the date of opening the savings accounts. This mechanism did not vary because it was expected from all the participants in the intervention group

Human Capital Theory

Human capital theory, a widely accepted concept in economics, suggests that the level of education and vocational training an individual receives influences their earnings over their lifetime (Gao et al., 2011). Developed by Gary Becker and Theodore Schultz in the 1950s and early 1960s, human capital theory centers on the production process (Garibaldi, 2006; Tan, 2014). This theory asserts that human capital, referring to an individual's skills and knowledge, enhances their productivity across various tasks, albeit to differing degrees depending on the task, organization, and circumstances. According to the theory, as an individual's education level rises, so does their productivity and earnings, making education a dual investment: one for the individual's increased productivity and earnings and another for the economic growth of a country (Tan, 2014).

According to Zamurrad Janjua and Ahmed Kamal (2011), education attainment exerts both direct and indirect effects on poverty alleviation, as illustrated in their conceptual framework in Figure 2. According to this framework, education directly influences individuals' skills, enhancing human capital and contributing to increased productivity and economic growth. Simultaneously, education indirectly influences awareness, improving health and capabilities, which in turn boosts productivity and leads to higher incomes. Additionally, education indirectly affects mobility, enabling individuals to secure employment anywhere and progress from lower-paying to higher-paying positions. In summary, whether through direct or indirect pathways, the benefits of education have the potential to transform population behavior, thereby influencing poverty levels (Ojide Kelechi Charity et al., 2021; Zamurrad Janjua & Ahmed Kamal, 2011).

Figure 2

Conceptual Framework of Impact of Education on Overty Alleviation
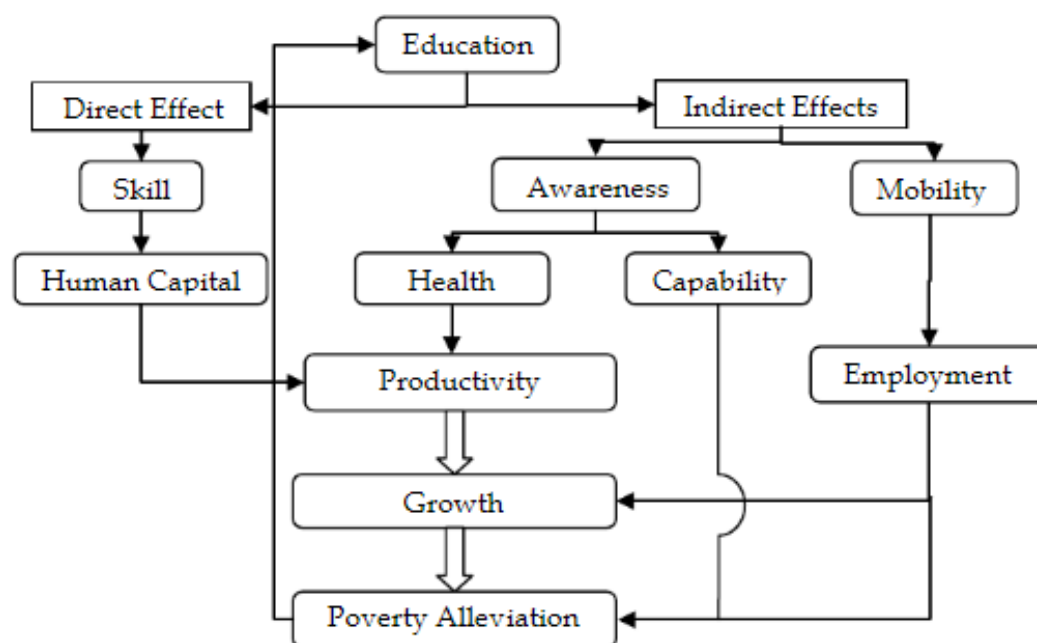
Note. Adapted from Janjua and Kamal (2011).

The Kyaterekera study proposed a strategy to improve the employability of WESW by providing vocational skills training and mentorship. This intervention involved transitional sessions to introduce women to a vocation of interest, followed by five hands-on vocational mentorship sessions. Subsequently, the women would be paired with role models in their chosen vocation for further mentorship (Ssewamala et al., 2019). However, this intervention component was not implemented due to the impact of COVID-19 pandemic on the study activities, which led to revisions in the study methodology, as explained in the discussion of the impact of COVID-19 on the Kyaterekera study in Chapter 4. The Kyaterekera study dataset, however, did assess women's educational attainment, their employment status outside of sex work, and the ease of securing a job in and beyond their communities. These variables can be used to support human capital theory.

Conceptual Framework

The conceptual framework was derived from a combination of sociocognitive theory and asset theory discussed in this chapter and it is illustrated in Figure 3.

Figure 3

Study Conceptual Framework
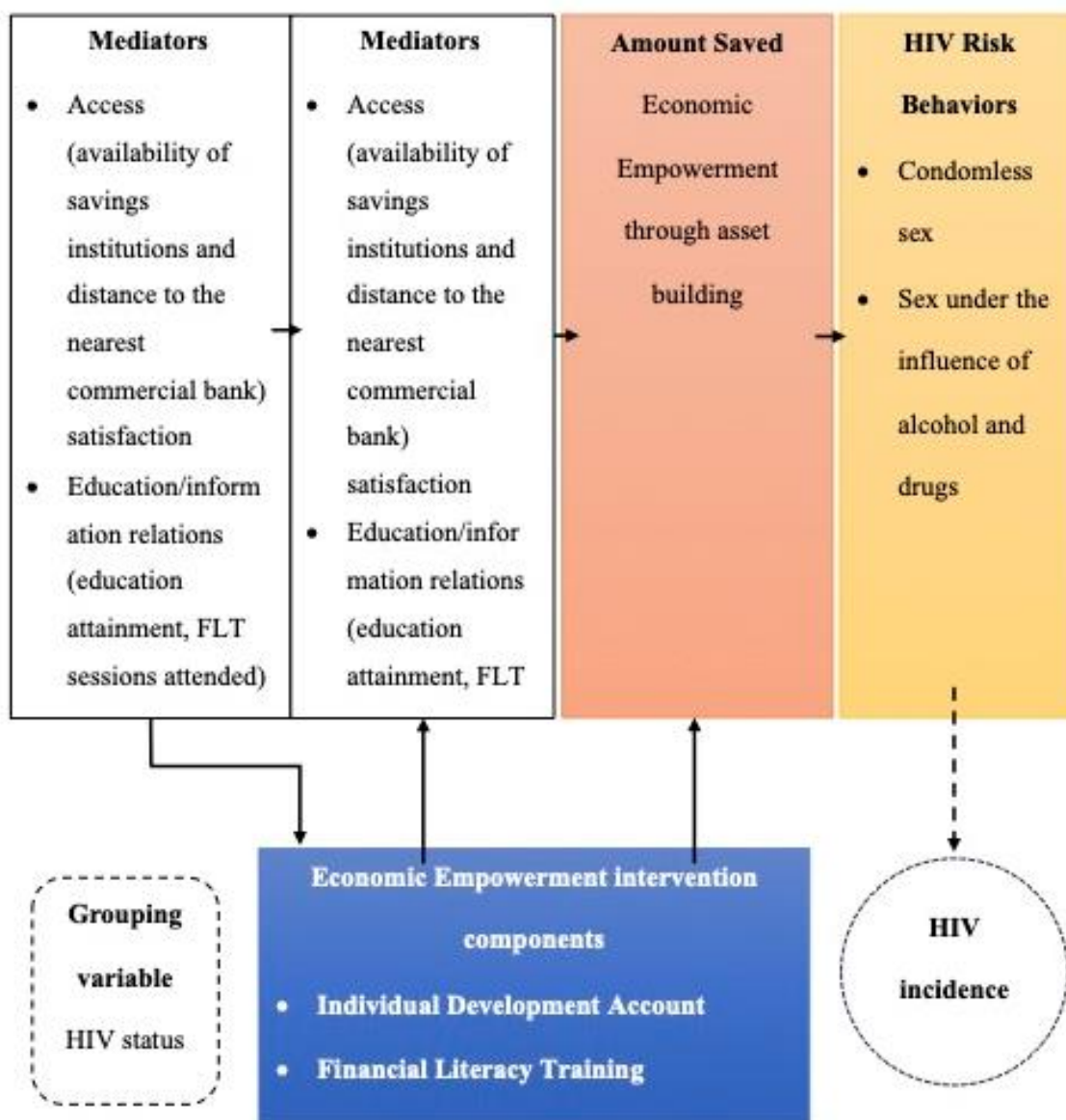
From the conceptual framework (Figure 3), moderators—specifically, environmental, personal and behavior factors, as postulated by the sociocognitive theory—affect women's participation in the economic empowerment intervention and their saving. The economic empowerment intervention enhances women's understanding by offering FLT on savings, which results in heightened savings and positively influences their high-risk behaviors. Savings lead to economic empowerment through asset building and investments. Through economic empowerment, women have control over resources and less dependence on income from sex work, which increases their assertiveness in safer sex negotiations. With safe sex comes a reduction in HIV risk-taking behaviors, a reduced number of sexual partners and thus reduced incidents of HIV.

In this dissertation, social (environmental factors) include community satisfaction, gender relations, and social support (Multidimensional Scale of Perceived Social Support). Cognitive factors (personal factors) include sex work stigma and perceived social support. Personality factors include alcohol use and condom self-efficacy. Access to savings institutions include presence of a commercial bank in a community, distance, and time it takes to walk to the nearest commercial bank. Information included the number of FLT sessions attended.

Chapter 3: Literature Review

This chapter provides a narrative review of literature on the sex work industry and WESW in SSA. The literature was collected by searching various sources on female sex work in SSA. The chapter is structured into seven subsections. First, it examines the definition of sex work, followed by the rationale for focusing on women, particularly in SSA. It then explores the intersection of women, sex work, and HIV, the economic dynamics of sex work in SSA, the impact of poverty on economic behavior, and the public health significance of studying economic behavior and HIV risk among WESW in SSA.

Sex Work

Sex work is one of the oldest types of labor in the world, dating back to at least 2400 BCE (Freeman, 2019). It has been practiced worldwide in ancient and modern cultures (Dolinsek & Hearne, 2022). Sex work is still illegal in most parts of the world and has never been accepted as legitimate work, despite a reconsideration to ease the strict sex work regulatory framework after World War II (Karlsson, 2022). Sex work continues to be illegal in most parts of the world because factions in society view sex work as a trade differently. Some feminists regard it as violence against women, whereas religious leaders from different denominations consider it as an evil act which inflicts negatively on the morals and health of young people (Grohs, 2019; Karlsson, 2022). On the other hand, sex-positive feminists and liberal groups advocate for the legalization of sex work, seeing it as a means to address the economic distress faced by women and other actors in the sector, as well as benefiting economies at large. They argue that legalizing sex work can boost tourism sectors, leading to increased revenues. However, they also acknowledge that if not well regulated, it can have negative social or cultural impacts (Gibly, 2023; Kempadoo, 2004; McCarthy et al., 2012).

Furthermore, the sex work industry has the potential to create more formal jobs, including roles such as managers, security personnel, and health educators, which could contribute to a reduction in unemployment and poverty, while also increasing tax revenues because these wages could be taxed. Additionally, legalizing sex work could help reduce illegal activities associated with it, such as human trafficking and exploitation (Gibly, 2023; Kempadoo, 2004; McCarthy et al., 2012).

The terms *sex work* and *prostitution* are sometimes used interchangeably because they refer to the exchange of sex for money or other goods and services. However, Musto et al. (2015) differentiated the two terms; *prostitution* is used in the labor system in terms of gender, sexuality and race; whereas, *sex work* is defined to include different types of intimate procedures without limitations on erotic, emotional, and economic labor (Musto et al., 2015). Persons who practice sex work are termed as sex workers and they are defined as those involved in prostitution and other forms of sex work (Balfour & Allen, 2014). The term *sex work* is has fewer derogatory, gendered, sexist, and racial undertones compared to *prostitution* (May et al., 2000). Therefore, these two terms should be used differently. The terms *sex work* and *prostitution* are also used interchangeably; however, they carry the same meaning. For this dissertation, I use *sex work* as a trade, *sex workers* as persons (women) involved in the sex trade, and *WESW* as women involved in the sex trade.

Why Focus on Women: The Economics of Sex Work

Worldwide, women are disadvantaged at several levels, including financial instability. They are heavily affected by cultural beliefs in societies, specifically in SSA (Amponsah et al., 2018). The World Bank and UNICEF reports indicate women in low and middle-income countries are less educated than men (LMIC) (Inter-Agency Task Force on Rural Women, 2012;

Odon et al., 2017). These lower levels of education put them at a disadvantage in the job market because they cannot compete favorably with men. In job markets, fewer women are in top-ranking positions levels than men, which affects their decision-making power and advance policies favoring them (World Economic Forum, 2021), resulting in genderedpay disparities and greater disadvantaging of women.

Culturally, women are perceived as less than men; therefore, men determine their destiny (Ngubane, 2010). To some, women are seen as sex objects, married off early in exchange for a dowry, trafficked, or worth only for the sex trade (Lowe et al., 2019; Ngubane, 2010). In SSA, women play a critical role in raising children; in fact, many men leave the responsibility of taking care of children entirely to women (Ferrant et al., 2014; United Nations Department of Economic and Social Affairs, 2011). There are less stringent laws to force men to look after their children in SSA compared with developed countries, which men take advantage of. Many women, especially the less educated, struggle to look after their families and become desperate to take on any job to provide income to fulfil these responsibilities. Many have limited options and end up selling their bodies in exchange for money (Gerassi, 2015; Khan et al., 2010). Out of the estimated 40 to 42 million sex workers globally, 75% are women (Goldmann, 2011). This shows that women are more at risk of challenges faced by sex workers.

Women Engaged in Sex Work in Africa

Sex work has existed in Africa from precolonial times to the modern day (Mgbako, 2019). During colonial times, sex work was attributed to migrations and emigrations. African women engaged more in sex work with the expansion of economies, which brought men to work in urban centers. This concentration of population increased opportunities and rewards of sex work for women to support their families (Mgbako, 2019). Different factors shape sex work in

Africa, including migration, culture, labor, and globalization. Sex work in SSA is street and venue based, mainly in urban areas, with significant activity connected to continental road highways (highways have sex work hot spots) and fishing communities (Mgbako, 2019). WESW in Africa face a high burden of HIV (Doshi et al., 2018; Hladik et al., 2017; Witte et al., 2022), physical abuse, and limited access to health care and other services(Baleta, 2015), primarilydue to poverty, criminalization, and stigmatization (Baleta, 2015).

In SSA, it is very difficult to determine the population of WESW due to its illegal status, discrimination, and criminalization. UNAIDS estimated the number of sex workers in SSA to be around 2.9 million (UNAIDS, 2021). A literature review performed by Laga et al. (2023) on literature published between 2000 and 2018 from 33 of the 44 countries in SSA estimated the number of female sex workers at 2.5 million of childbearing age (Laga et al., 2023). Countries in SSA vary in their sex work frameworks and legal status for sex work. Apart from Senegal, where sex work is legal and regulated, it is illegal across the continent (Ngugi et al., 2012).

Women Engaged in Sex Work and HIV

Globally, WESW are 30 times more likely to acquire HIV than the general population, which makes it difficult to prevent and control the virus in the heterosexual population (Abdella et al., 2022b). HIV prevalence among WESW globally varies by country and region; however, 8% of all new HIV infections were reported among WESW, and 32.8% of WESW are not aware of their HIV status in the year 2019 (UNAIDS, 2021a). HIV prevalence among female sex workers in Africa is estimated to be around 37%. This is significantly higher than the global HIV prevalence rate of 12%. HIV infection among female sex workers in Africa is often linked to a number of risk factors, including poverty, lack of access to healthcare and education, social exclusion and gender-based violence (Africa et al., 2022; UNAIDS, 2019). Additionally, a lack

of access to HIV prevention and treatment services, as well as a lack of understanding of the risks associated with sex work, can also contribute to the high prevalence of HIV among female sex workers in Africa(Africa et al., 2022; UNAIDS, 2019). Behavioral and structural factors have been noted as leading enabling factors of the high risk of HIV among WESW (Scorgie et al., 2012; Shannon et al., 2015). Behavioral factors cited include multiple sexual partners, intermittent condom use, and type of sexual activity (manual, vaginal, anal, and oral sex) (Baral et al., 2012; Dunkle et al., 2005; C. Wang et al., 2007). Structural factors include economic factors, government policies, and organizational environment (Marshall et al., 2009). Specifically, increased rates of poverty, gender disparities, physical and sexual violence, stigma and discrimination related to sex work, and social exclusion aggravate the risk of HIV and STI among WESW (Argento et al., 2011; Onyeneho, 2009; Simić & Rhodes, 2009).

Economics of Sex Work

Sex work, as defined by Freeman (2019) and Orchard (2020), involves the trading of sexual services for money, goods and other services or the exchange of sexual labor for money and other services or material. However, for this dissertation I focus on the exchange of sexual services for money or payment (economic compensation) (Johansson & Hansen, 2023; Murphy, 2010).

Demand and supply dynamics, as in other trades, play a crucial role in the sex work industry. On the demand side, Della Giusta et al. (2012) categorized clients into experimenters and regulars. Experimenters are individuals with little or no prior experience with sex workers, often holding traditional, misogynistic beliefs. They view sex workers as different from other women but also condemn them, seeing them as a supplement to stable relationships. In contrast, regulars have more progressive views on women and sex workers, preferring variety and

showing less concern for control. Their demand for sex work tends to increase with age and stable employment, indicating a positive income effect. These clients are content to fulfill their sexual desires through sex workers rather than pursuing traditional relationships. (Della Giusta et al., 2012).

Women Engaged in Sex Work, Poverty and Economic Behavior

Savings and Poverty

Saving is precarious for individual and institutional prosperity (Karlan et al., 2014). Saving involves forfeiting current consumption to accrue capital, producing extra output that can hypothetically be used for future consumption (Gersovitz, 1998). In other words, savings enables an individual to accumulate assets that act as insurance for future consumption. At the societal or macroeconomic level, savings are a huge determinant of future economic development (Karlan et al., 2014).

According to the World Bank, the household saving rate in Africa was estimated at 7.8% in 2018, which is lower than the global average, estimated at 11.7% (Organisation for Economic Cooperation and Development, 2023). The overall household saving rate in Africa is affected by a variety of factors, including income inequality, poverty, and access to financial services. In addition, the majority of African households have limited access to savings and investment products, which limits their ability to save. Furthermore, the majority of African households are engaged in the informal economy, which can lead to unstable income and make it difficult to save. Private savings currently dominate national and domestic savings; household savings play a critical part in most countries (Aryeetey & Christopher, 2000). Most household savers do not use commercial institutions due to high fees charged by the bank; they instead use savings and credit cooperatives (SACCO) and other informal structures with unforeseen shortcomings. Some

of the challenges the informal structures face are that the central bank does not regulate them; therefore, there is mistrust among savers. It is difficult to join a SACCO for people outside a particular community or if members disapprove of an applicant, which limits the participation of WESW, who are already discriminated against due to the nature of their work. They find no alternative ways of saving at formal and informal institutions.

The most noted barrier to low savings is lack of FLT. Few institutions provide financial literacy, and the few that do charge exorbitant rates and fees; therefore, few people can afford them, particularly WESW. There is also a lack of information on available savings products among WESW; most information is passed on to cooperative savers or those who save with formal institutions. Banks in SSA target established institutions for their financial products and services, which leaves WESW ignorant about financial services, especially savings, that can help them accumulate capital to build assets. With no savings, chances are high that WESW will never accumulate capital to start their own enterprises but will stick to sex work, which is risky to their lives.

Public Health Relevance

WESW have been and will always be a more significant part of the key population and are always at risk of HIV and other STIs, human rights abuse, intersectional stigma, and physical violence because their work is illegal in many countries. Due to the illegality of their activities, they are discriminated against and criminalized, but this does not stop them from trading sex to their clients. Their clients are also at greater risk of HIV and other STIs and put their sexual partners similarly at risk The sex industry is well established and expected to grow due its connection to poverty and the 9.2% of the world population that lives in total poverty (less than $1.9 a day; World Bank, 2020). The World Bank (2020) reported that the COVID-19 pandemic

pushed more than 97 million people into extreme poverty in 2020 (World Bank, 2020).

Therefore, the world is likely to witness an increase in the number of WESW. Sex work cannot

be stopped, but there is a need to address the drivers and the health-related challenges faced by

WESW through economic behavior. WESW are a significant subpopulation of the epidemiology

of HIV infection in the world (Ngugi et al., 2012). WESW are 26 times at higher risk of

acquiring HIV (UNAIDS, 2021a), and the key populations (including WESW) and their sexual

partners account for 65% of all HIV infections worldwide (UNAIDS, 2021b). Reducing the risk

of HIV among WESW minimizes the risk to their clients and the general population at large.

Chapter 4: Methodology

This dissertation analyzed longitudinal data from the Kayterekera study, which used repeated measures with three waves of data collected over a 12-month period: baseline, 6-month follow up, and 12-month follow up. The Kayterekera study initially recruited 542 participants, all of whom completed baseline assessments. However, there was some attrition in the follow-up assessments, with 483 participants completing the 6-month follow up and 481 completing the 12-month follow up, resulting in an 11.25% attrition rate between baseline and the 12-month follow-up assessment. This attrition rate was primarily attributed to COVID-19 lockdown in the country and the work mobility of the WESW estimated at 39% (Davey et al., 2018).

The Kyaterekera Study

The Kyaterekera study is a longitudinal randomized control trial that aims to evaluate the efficacy of adding economic empowerment to traditional HIV risk reduction methods in reducing new incidences of HIV and STIs among vulnerable women in Uganda. The study, which spans 5 years from 2018 to 2023, with an additional year of a no-cost extension, is funded by the National Institute of Mental Health under award number R01MH116768, with Fred Ssewamala, PhD, and Susan Witte, PhD, serving as the principal investigators. The study was registered with the U.S. National Library of Medicine (Ssewamala et al., 2019).

The Kyaterekera study is structured around four specific aims:

1. Examine the impact of a financial savings-led microfinance intervention using HIV risk reduction (HIVRR) plus MSAs (S) (HIVRR+S) and HIV risk reduction plus MSAs plus FLT and Mentorship (FLM) (HIVRR+S+FLM) on HIV biological and behavioral outcomes in FSWs using an randomized control trial.

2. Examine intervention mediation and effect modification.

3. Examine qualitatively and quantitatively the implementation in each study condition.

4. Assess the cost and cost-effectiveness of the HIVRR+S+FLM intervention compared with traditional HIVRR in terms of the cumulative number of STI and HIV cases averted over the 24-month period.

The Kyaterekera Study Design and Methods

From June 2019 to March 2020, the Kyaterekera study recruited 542 WESW, aged 18 to 54 years, from 19 HIV hotspots along the trans-African highway and fishing villages on the shores of Lake Victoria across five districts—Masaka, Mpigi, Kyotera, Rakai, and Kalungu.

Inclusion Criteria: Women were eligible to participate if they

1. were aged 18 years and above.

2. exchanged sex for money or other goods and services in the previous 30 days.

3. Reported at least one episode of unprotected sex in the previous 30 days.

All eligible participants completed the consent process to participate in the study and undergo data collection. Participants were ineligible if they had a psychiatric impairment that could prevent them from understanding and following the study procedures, were not willing to complete all study procedures, or were participating in a similar program concurrently.

The recruited participants were randomized into three groups: the control group, Treatment Group 1, and Treatment Group 2. Participants in the control group received treatment as usual, which included health education sessions, HIV testing, and STI screening, along with four evidence-based HIVRR sessions provided by community health workers (CHWs).

Participants in Treatment Group 1 received treatment as usual, four evidence-based HIVRR sessions, an MSA, and six sessions of FLT delivered by experienced members of the research team.

Impact of COVID-19 on the Kyaterekera Study

The Kyaterekera study initially aimed to recruit 990 participants from 33 hotspots in seven districts of greater Masaka: Masaka, Lwengo, Lyatonde, Mpigi, Rakai, Kyotera, and Kalungu. These participants were intended to be randomized into three arms: HIVRR (*N*=330), HIVRR+S+FLT (*N*=330), and HIVRR+S+FLT+V (*N*=330). However, the onset of the COVID-19 pandemic in Uganda during the recruitment phase led to a nationwide lockdown with various restrictions, including limited physical contact. These restrictions significantly impacted study implementation, prompting a revision of the study methodology.

At the time of the lockdown, the study had successfully recruited 542 participants from 19 hotspots in four districts. HIVRR sessions had been conducted at 17 sites, FLT sessions were ongoing, and the vocational skills training and mentorship component had not yet commenced. Given the uncertainty surrounding the duration of the COVID-19 pandemic, the study methodology was adjusted. Only participants recruited before the lockdown were included, and the two active study arms (HIVRR+S+FLT and HIVRR+S+FLT+V) were merged because the vocational component had not been initiated. The HIVRR sessions at the remaining two sites were completed after a partial lift of the lockdown and ease in restrictions. However, the FLT sessions for the remaining sites under the intervention group were never completed. By the time of the lockdown, out of 12 sites under the intervention arm, the team had delivered up to Session 6 at eight sites, Session 3 at two sites, and Session 2 at two sites. Biomarker collection was suspended to minimize physical contact with participants; however, it was resumed at the 18- and 24-month follow-up data points.

Data Collection

All participants who consented to participate in the Kyaterekera study completed a baseline assessment and a biological assay. The assessment data were collected using a 90-minute structured instrument administered by trained research assistants. The instrument was administered in Luganda because it is the most used language in the study region. The data collection tools were developed in English, translated to Luganda, and back-translated to English for consistency by language experts from Makerere University, Kampala-Uganda. The research assistants were trained in Good Clinical Practices and completed the Collaborative Institutional Training Initiative Certificate.

Participants were assessed on a range of topics, including information on participants' demographics, family and community background, social support, gender relations, family socioeconomic status (employment and household finances), savings (attitudes about savings, financial self-efficacy and behavioral economics measures), sex work (including sex work survival and sex worker stigma), arrest information, gender-based violence (domestic violence attitudes, intimate partner violence, and economic abuse), sexual behaviors (including sex life, condom self-efficacy, condom use communication self-efficacy with intimate and paying sex partners), behavioral survey (alcohol use and drug use, needle sharing behaviors), peer norms, childhood sexual abuse, HIV/AIDS (HIV knowledge, prevention attitudes, stigma, discussions with sexual partners, HIV testing, adherence to medication, PrEP), physical and mental health (depression, PTSD, social desirability), access to medical care and barriers to medical care.

Kyaterekera Intervention

HIV Risk Reduction

Evidence-based HIV risk reduction sessions were delivered by trained CHWs. The four

sessions covered (a) supporting healthy behaviors, (b) reducing risk from HIV and STIs, (c)

strengthening skills to keep safe and healthy, and (d) reducing violence and planning a safer

future. Session 1, supporting healthy behaviors, was aimed at creating better comfort to talk

about sex, defining symptoms and transmission risks of different STIs and identifying reasons

for goal setting for risk reduction. Session 2, reducing risk of HIV and STIs, was aimed at

building skills for proper condom use, sexual communication patterns with pay and intimate

partners, and safer sex negotiating strategies. Session 3 concentrated on identifying and dealing

with personal triggers for safer sex, and Session 4 looked at discussing reasons for keeping

healthy and setting risk-reduction goals. Weekly hour-long HIVRR sessions were delivered by

CHWs. CHWs received training on session delivery from the study principal investigators and

underwent sensitivity training to prepare them for interacting with WESW, given the sensitivity

of the target population. Throughout the sessions, medical personnel were invited to provide

additional information on PrEP as an HIV prevention strategy, and participants had the option to

voluntarily enroll in this service. The sessions were conducted after baseline interviews.

Economic Empowerment Intervention

Matched Savings Accounts

Participants randomized to the intervention arm were provided with an MSA structured

as an IDA. These MSAs were established at a local bank, and deposits made by the women were

matched by the program to incentivize savings. Each participant was issued an IDA in their own

name at a financial institution registered by the Central Bank (Bank of Uganda). The account

was complemented with funds from the program, with a maximum monthly contribution eligible for matching set at US$15 per family for the 10-month intervention period. Women retained the flexibility to withdraw their savings and the matched deposits without restrictions imposed by the study team. Nonetheless, they were encouraged to use these funds for initiating income-generating activities. The study team monitored the expenditures of withdrawals from the MSA through participants' self-reported financial diaries.

Financial Literacy Training

Participants in the treatment group underwent six sessions of FLT facilitated by a trained study team. The objective was to equip participants with knowledge to enhance their savings and entrepreneurship skills. The sessions addressed various topics: bank services, savings, budgeting, debt management, and strategies for increasing savings, especially for emergencies.

- Session 1: Bank services. Introduced participants to the opportunities of using banking services, managing risks, and understanding delay discounting.

- Session 2: Budgeting session. Focused on helping women grasp the importance of budgeting, working in a budget, setting financial goals, and effective money management.

- Session 3: Debt management sessions. Explored topics such as loan management, the cost of borrowing money, and the risks associated with overborrowing, defaulting, and delinquency.

- Sessions 4, 5, and 6: Savings session. Discussed the significance of savings and the development of personalized savings plans.

The sessions were conducted by trained research team members and followed the HIVRR sessions. The aim was to empower participants with financial knowledge to enhance their economic well-being.

Ethical Approval

The research study in Uganda obtained approval from the Uganda Virus Research Institute Ethics Committee (GC/127/18/10/690) and the Uganda National Council for Science and Technology (UNCST –SS4828). Additionally, the study received approval from the Institutional Review Boards of Washington University in St. Louis (#201811106) and Columbia University (AAAR9804). Prior to engaging in any study-related activities, all participants underwent a thorough consenting process. The consent procedure explicitly communicated to participants their right to withdraw from the research activity at any time without the need to provide a specific reason (Ssewamala et al., 2019).

Methodology

I analyze data from all participants recruited in the Kyaterekera study who were randomized into the intervention and control arms. The primary source of information is self-reported data from study participants obtained at baseline, 6-month, and 12-month follow-up data points. Additionally, the study team collected monthly bank statements detailing the total amount saved and matched, as well as the number of monthly deposits made by participants in the intervention group. These data were entered into the Management Information System for Individual Development Accounts (MIS IDA) over the 10 months of the intervention. The actual savings data from MIS IDA is only used to analyze incomes compared to reported expenditures in financial diaries data under Aim 3.

Measures

Dependent Variables

HIV risk-taking behaviors were assessed through two variables: vaginal and anal condomless sex and engaging in sexual activities under the influence of alcohol and drugs. Participants were asked about the frequency of vaginal and anal sex with their most recent sexual partner and intimate partner/regular partner in the last 30 days. Additionally, they reported the number of times they used male or female condoms during these encounters. Women who reported using a condom less than 100% of the time during vaginal and anal sex were categorized as having condomless sex (coded as 1=yes), whereas those reporting an equal number of times engaging vaginal and anal sex and condom use with both partners were coded as not having condomless sex (coded as 0=no). Women were asked about the use of alcohol or drugs by themselves or their partners prior to engaging in vaginal and/or anal sex in the last 30 days. Women who reported using alcohol or drugs, or their partners, before engaging in these sexual activities one or more times, were coded as having engaged in sex under the influence of alcohol and drugs (coded as 1=yes). Those who did not report such substance use were coded as not having engaged in sex under the influence of alcohol and drugs (coded as 0=no).

Economic behavior was assessed using the amount of money saved, reported income, and expenditure by the women.

Savings included reported savings in the survey data and the actual savings made by WESW in their bank accounts, as recorded in the MIS IDA, as described in the Methodology section. The actual savings included the deposits made by the women and the match provided by the Kyaterekera study. For the reported savings, women were asked the amount of money they had saved, which was reported in Ugandan shillings.

Income is the self-reported estimated monthly income in Ugandan shillings.

Expenditure data were extracted from financial diaries booklets given to women in the intervention group. Women reported their daily expenditures in Ugandan shillings.

Independent Variables

Demographic variables were age, marital status, and level of education. Age was measured as a continuous variable and maintained as the same for this dissertation. Marital status had seven possible responses: 1=*married,* 2=*in relationship,* 3=*divorced,* 4=*separated,* 5=*widowed,* 6=*single* and 7=*never married.* These were recoded into three categories. *Married* and *in relationship* were merged and coded as *married* (*0=married*). *Divorced, separated,* and *widowed* were merged and coded as *separated* (*1=separated*). *Single* and *never married* were merged and coded as *single* (*2=single*).

Socio (Environmental Factors). These include gender relations (socionorms) and community satisfaction (access in the community).

Gender relations was measured using the Gender Relations Scale that is part of the Compendium of Gender Scales (Nanda, 2011). This 16-item scale assesses equity and power in intimate relationships on issues related to attitudes towards gender roles and expectations, decision-making around sex and reproduction, household decision-making, violence, and communication. Responses occur on a 3-point Likert scale with: 1=*Agree,* 0=*Disagree,* and 0=*Not sure*. The scale has a theoretical range of 16–48, with a higher score indicating positive gender relations, a lower score indicating negative gender relations, and a Cronbach's alpha of 0.67.

Community satisfaction was measured using the Community Satisfaction Scale (Athay et al., 2012). The scale has eight items and assesses a participants' satisfaction about their family,

friends, and community/living environment. Women rated their community satisfaction on a 5-point Likert scale: 1=*never*, 2=s*ometimes,* 3=*about half the time,* 4=*most of the time, and* 5=*always*. The Cronbach's alpha and the theoretical range of the Community Satisfaction Scale were 0.89 and 1–5, respectively. A higher score indicates higher community satisfaction.

Cognitive (personal factors) were social support, family cohesion and sex work stigma.

Social support was measured using the Multi-Dimensional Scale of Perceived Social Support (Zimet et al., 1988). The 12-item scale measured women's perception of social support in three domains, including family, friends, and significant other. Women rated their perception using a 7-point Likert scale with 1=*very strongly disagree*, 2=s*trongly disagree*, 3=*mildly disagree*, 4=*neutral*, 5=*mildly agree*, 6=*strongly agree*, and 7=*very strongly agree*. The scale has a Cronbach's alpha of 0.89 and a theoretical range of 12–84, with higher scores indicating higher levels of perceived social support.

Sex work stigma was measured using the Sex Work Stigma Index (Liu et al., 2011). The 10-item 4-point Likert scale asked women to rate their thoughts about people's reactions if they disclosed or found out that they were engaged in sex work. The four possible responses were 1=*strongly disagree,* 2=*disagree,* 3=*agree,* and 4=*strongly agree.* The scale has a Cronbach's alpha of 0.92 and a theoretical range of 10–40, with a higher score indicating higher levels of stigma.

Access to saving institutions was assessed by considering the presence of a banking institution in the participants' community and the distance required to walk to reach this banking facility. Women were asked to name any commercial bank nearest to their community or their current residence. Those who named a bank were coded as having access (1=*yes*) and those who did not named a bank were coded as having no access (0=*no*). Participants were also asked

whether they could walk to the nearest bank to their community with two possible responses, *near (about 0–2 kms, you would walk)* or *far (over 2 kms, one would not easily walk)*. Near was coded as having access and far as no access.

Information was level of education attained and number of FLT sessions attended.

Level of education had nine possible responses: 1=*did not go to school*, 2=*dropped out before primary,* 3=*completed primary,* 4=*dropped out before high school,* 5=*completed high school and stopped,* 6=*dropped out before senior,* 7=*completed senior and stopped,* 8=*I have a technical/vocational college diploma,* and 9=*I have a university degree*. These were collapsed into two categories: three responses—*did not go to school*, *dropped out before primary,* and *completed primary*—were recoded as *primary education* (0=*primary education*). Six responses—*Dropped out before senior, completed senior and stopped, dropped out before senior, completed senior and stopped, I have a technical/vocational college diploma,* and *I have a university degree* were recoded as *postprimary education* (1=*postprimary*).

FLT attendance records were maintained for each FLT session, and participants who attended 50% or more of the sessions were coded as having received information (coded as 1=*yes*), and those who attended less than half were coded as not having received information (coded as 0=*no*).

Expectations (saving goals) were recoded with *confidence to save* measures as a proxy for expectation. Confidence to save was measured using a 5-item 5-point Likert scale. WESW were asked to rate their confidence level to save for a specific goal. Possible responses were 1=*not confident at all,* 2=*not very confident,* 3=*somewhat confident,* 4=*very confident, and* 5=*extremely confident.* The scale has a Cronbach's alpha of 0.87 and a theoretical range of 5–25, with a higher score indicating higher confidence in achieving a saving goal.

Health-related variable was recorded through self-reported HIV results rather than biomarkers because biomarkers were not collected at 6- and 12-month follow-up data points. To ensure accuracy, the self-reported HIV results were validated through a validation study, comparing the baseline self-report data with the baseline biomarker HIV results. In the self-reported data collection, WESW were asked if a health professional had ever informed them, following an HIV test, that they were HIV positive. This was recorded as a binary outcome with positive (1=*yes*) and negative (0=*no*). More details of the measures are shown in Table 4.

Table 4

Dissertation Assessment Variables

Variable		Scale	Level of Measure	Alpha
Dependent variables				
1	HIV risk behavior: Condomless sex and sex under the influence of alcohol and drugs		Binary	N/A
2	Economic behavior: Savings, income, and expenditure		Continuous	N/A
Independent variables				
1	Demographics			
1a	Age		Continuous	N/A
1b	Marital status		Nominal	N/A
2	Social factors (Environmental)			
2a	Gender relations	Gender Relations Scale	Nominal	0.67
2b	Community satisfaction	Multidimensional Students' Life Satisfaction Scale	Nominal	0.89
3	Cognitive factors (personal)			
3a	Social support	Multi-Dimensional Scale of Perceived Social Support	Nominal	0.89
3b	Sex work stigma	Sex Work Stigma Index	Nominal	0.92
4	Access to saving institutions			

	Variable	Scale	Level of Measure	Alpha
4a	Presence of a commercial bank in the community and distance to nearest commercial bank		Nominal	N/A
5	Information			
5a	Level of education		Ordinal	N/A
5b	Number of FLT sessions attended		Nominal	N/A
6	Expectations (saving goals)			
6a	Confidence to save	Confidence in saving for a specific goal	Nominal	0.87
7	Health related variable			
7a	Self-reported HIV results		Nominal	N/A

Chapter 5: Analytical Approach

Data Management

Using STATA18 software, this dissertation conducts univariate description of all variables of interest and reports and presents the means, standard deviations, frequencies, and measures of central tendency. Baseline data is used to study the characteristics of the participants. Means and standard deviations are presented for continuous variables and percentages and frequencies for categorical variables. The characteristics are categorized by HIV status (positive and negative) of the participants at baseline.

Data Preparation

Variables of interest were pulled from the main dataset and checked for errors, accuracy consistency, and completeness using IBM SPSS 29 and STATA18. Scale measures were summed into continuous variables. This dissertation used self-reported HIV results. To determine the accuracy of these data, a validation study was conducted comparing HIV self-reported results and the bioassay results at baseline. The results showed a 94.39% agreement with a Kappa value of 0.881, which is almost a perfect agreement and shows that the self-reported results were reliable and consistent (McHugh, 2012).

Missing Data

For Aim 1 of this dissertation, which examines the short and midterm efficacy of an economic empowerment intervention on the HIV risk behavior of WESW, data were examined for missing cases at baseline, 6-month and 12-month follow up. The results showed that there were 85.79% (N=465) complete cases at all waves of data, 7.93% (N=43) of participants missed both 6- and 12-month follow up. A total of 18 (3.32%) participants missed 6-month follow up and 16 (2.95%) missed 12-month follow up. However, Aim 1 used the multilevel models where

the missing data is handled in the analysis. The model is estimated using full information

maximum likelihood method. Indeed, the multilevel models used in the analysis allows for

missing data to be treated and there is no need of replacing or imputing missing values (Collins

et al., 2001; S. G. West, 2001).

For Aim 3 of this dissertation, which examined the association between savings, savings

expectations, information on process and rewards to savings, and access to savings institutions

among WESW in relation to their HIV status, data were examined for all the covariates and the

results showed that 67% of the cases were complete, 30% missing with 7% (of the 30%)

completely missing. Multiple imputation (*mi*) was employed to address the missingness in the

data. Data were declared *mi* and used chained equations using *mi set mlong* and *mi impute*

chained command respectively.

Data Analysis

Data analysis was conducted for each study aim.

Aim 1a: Examine the short and midterm efficacy of an economic empowerment

intervention on the HIV risk behavior of WESW. The sample characteristics by group (treatment

and control) were presented at baseline to check if there are observable differences. A three-level

multilevel logistic regression model that assessed the short and midterm efficacy of economic

empowerment intervention on the HIV risk behavior of WESW was fitted. The model assessed

the time x intervention interaction for variations in HIV risk-taking behaviors at baseline, 6-, and

12-month follow-up intervals. Multilevel models accounted for data clustering because the

participants were nested in study sites (Level 3) and observations were nested in each individual

participant (Level 2). Random intercepts for site IDs were included to account for clustering. An

unstructured covariance matrix was incorporated to the model to check the correlation among

residuals of the repeated measures. For missing data, a mixed-effects model was used to estimate

changes in repeated measures for data missing at random (MAR). The two models included the

intervention group (*HIVRR+S+FLT*), a time point variable (baseline, 6- and 12-month follow

up) and their interaction terms. The model was fitted with robust standard errors clustered by site

IDs for HIV risk-taking behaviors. Standardized residuals were plotted to check for normality of

their distribution and whether their variance was relatively constant across the predicted values.

The unstandardized odds ratios (*OR*) along with their corresponding 95% confidence intervals

(CI) and graphical representations are provided.

Aim 1b: Evaluate the differential impact of the economic empowerment intervention on

the sexual risk-taking behaviors by HIV status (positive and negative) of WESW. The analysis

outlined for Aim 1a was performed for Aim 2b with stratification by the HIV status of women

(positive and negative).

Aim 2: Examine the patterns of savings in relation to expenditure and HIV status

(positive and negative) among WESW. Women's income and expenditure patterns were

examined using data recorded in their financial diaries for the first 6 months. Then, the income

and expenditures grouped by women's self-reported HIV status (positive and negative) were

analyzed. The expenditures are grouped by category: food, housing, health, education, sex work,

and other living expenses. Graphs showing the trends in saving and expenditure grouped by HIV

status were produced to examine the relationships.

Aim 3: Examine the association between savings, savings expectations, information on

process and rewards to savings and access to savings institutions among WESW in relation to

their HIV status. Here I used women's savings amount as the response variable and savings

expectations, information on process and rewards to savings, and access to savings institution as

the main predictors. Other covariates were marital status, education attainment (education level), gender relations, community satisfaction, social support, sex work stigma, asset ownership, and confidence to save, all of which were informed by social cognitive theory and asset theory, as discussed in Chapter 2. Multilevel linear regression models were constructed. Multilevel models helped to account for data clustering because participants were nested in study sites and observations were nested in each individual participant. Participants were recruited from study sites, and data were collected from participants recruited under each site. Adjusted and unadjusted regression models are presented in tables. The models were fitted with robust standard errors clustered by site IDs for savings. Standardized residuals were plotted to check for normality distribution and whether their variance was relatively constant across the predicted values. Unstandardized regression coefficients (β) and the 95% confidence interval (CI) and graphs were presented.

Aim 4: Examine the cost and cost-effectiveness of economic behavior change among WESW in Uganda. Cost of the intervention was conducted first and later used to calculate the cost-effectiveness. Per participant costs for each study arm were calculated based on the activity-based microcosting approach from the program provider's perspective. All the resources used to implement the intervention were measured and valued. Costing data were systematically gathered for all intervention activities, starting from the commencement of the study, and meticulously recorded in a database. The data were then classified into 11 categories: personnel, identification of study sites and site visits, screening and recruitment of study participants, usual care: delivery of HIVRR sessions, training of HIVRR facilitators, IDA, delivery of FLT sessions, donated resources, program overheads, stakeholder engagement and dissemination, and capital costs.

Personnel information was derived from administrative and study financial records, encompassing the time allocated by study staff to intervention and research activities in each study arm. The process involved extracting the annual number of hours dedicated by each staff member to program activities, multiplying this figure by the average hourly salary rate (estimated from the average annual gross wage rate), and aggregating the total cost across all staff. The total cost incurred annually was then apportioned based on the level of effort devoted by staff to program activities (80% for program activities versus 20% for research) (Tozan, Capasso, Namatovu, et al., 2022; Tozan, Sun, et al., 2019) and to each study arm (10% for HIVRR and 90% for HIVRR+S+FLT). Finally, this apportioned cost was divided by the number of participants in each study arm. Research costs were excluded from the analysis.

Identification of study sites and site visits was deduced through the incentives offered to hotspot/site coordinators, who were instrumental in identifying study participants, with these coordinators being leaders among WESW at each hotspot (Nabunya et al., 2021). The annual total cost of the incentives paid out was divided by the number of participants in each study arm.

Screening and recruitment of study participants involved with providing incentives to site coordinators for mobilizing participants, compensating participants for their time, and remunerating interviewers for screening activities. The annual total cost was then divided by the number of participants in each study arm.

For usual care (delivery of HIVRR sessions), the study offered participation incentives for participants, facilitation incentives for CHWs, incentives for site coordinators, and covered venue expenses for HIVRR sessions. The total cost of delivering HIVRR sessions each year was then divided by the number of participants in each study arm.

Training of HIVRR facilitators was done through offering participation incentives for CHWs trained to deliver HIVRR sessions. The total cost incurred was divided by the number of participants in each study arm.

Individual development accounts expenses were incurred for account opening, initial deposit, and matched contributions related to IDA. The total cost of opening IDAs and the aggregate amount of matched contributions were subsequently divided by the number of participants in the HIVRR+S+FLT arm.

Delivery of FLT sessions was done by offering participation incentives for participants, facilitation incentives for site coordinators, and covering venue expenses for FLT sessions. The total cost of delivering the FLT workshops each year was then divided by the number of participants in the HIVRR+S+FLT arm.

Program overhead included study expenses related to utilities (water, electricity, communication), transportation (fuel, taxi fare, car hire), security services, insurance, maintenance (equipment, vehicles, and facilities), materials, office supplies, and other miscellaneous costs. Total annual cost was allocated based on the staff's effort dedicated to program activities (80% for program activities versus 20% for research) (Tozan, Capasso, Namatovu, et al., 2022; Tozan, Sun, et al., 2019) and to each study arm (10% for HIVRR and 90% for HIVRR+S+FLT). This apportioned cost was then divided by the number of participants in each study arm.

Stakeholder engagement and dissemination was done by providing participation incentives to stakeholders attending the study induction seminars and covered expenses for materials and office supplies. Total annual cost was then divided by the number of participants in each study arm.

Capital costs for items with an expected useful life of more than 1 year, such as equipment, vehicles, and furniture, were considered. The computation involved amortizing all capital costs over the useful life of the items (3 years for equipment, 5 years for furniture, and 10 years for vehicles) using an annual discount rate of 3%. The total cost incurred each year was then apportioned based on the level of effort dedicated by staff to program activities (80% for program activities versus 20% for research) (Tozan, Capasso, Namatovu, et al., 2022; Tozan, Sun, et al., 2019) and to each study arm (10% for HIVRR and 90% for HIVRR+S+FLT), and this apportioned cost was divided by the number of participants in each study arm.

Capital costs were annualized using the replacement cost of each capital item (Walker & Kumaranayake, 2002). All these costs were collected prospectively during the intervention period (2018–2021). The costs were adjusted for inflation using the consumer price index for each year of implementation (2018, 2019, 2020 and 2021) provided by the Uganda Bureau of Statistics (2021a) and discounted at an annual rate of 3% as standard for cost-effectiveness analysis (Tan-Toress et al., 2003). The cost per participant were presented in 2019 US dollars (using 2019 as the base year because most of the intervention activities were implemented in 2019) (Bank of Uganda, 2023).

The cost-effectiveness used the cost analysis above and effect results from Aim 1a and was guided by the Consolidated Health Economic Evaluation Reporting Standards 2022 (Husereau et al., 2022). The difference between the per participant costs in the control and the treatment groups were calculated, divided by the effect size of the intervention at 12 months follow up (intervention#time effect at 12-months), and multiplied by 0.2 standard deviations. A benchmark of 0.2 standard deviation was chosen to represent a small effect size, as effects for these outcomes typically fall in the range of 0.2 to 0.4. In the analysis, I examined the additional

cost of the intervention (relative to usual care) for an additional unit change in women's HIV risk behavior in relation to usual care (*HIVRR* sessions) from a provider's perspective using incremental cost-effectiveness ratio (ICERs) (Tozan, Capasso, Sun, et al., 2021). The cost difference between *HIVRR only* and *HIVRR+S+FLT* per participant were calculated. The changes in HIV risk behavior over the intervention period and across the study arms were calculated, and the estimates for ICERs by getting proportions of the increment in the total cost of providing the intervention to women in *HIVRR+S+FLT* and the unit change in HIV risk behavior to get the incremental cost of a one additional unit change in HIV risk behavior. A sensitivity analysis using Monte-Carlo simulation to examine the ICERs for pessimistic and optimistic scenarios (high cost/low vs low cost/high effectiveness) for the intervention was conducted (Ramsey et al., 2015).

Chapter 6: Findings

Aim 1a

Aim 1a was to examine the short and midterm efficacy of economic empowerment intervention on the HIV risk-taking behaviors of WESW.

This section addresses Aim 1a of the dissertation, which focuses on examining the short and midterm effectiveness of an economic empowerment intervention on the HIV risk-taking behaviors of women involved in sex work. The sample characteristics are presented in Table 5 and Table 6. As previously indicated, the study methodology underwent revision, transitioning from two treatment arms to one in response to COVID-19 restrictions. I present the baseline sample and its characteristics for both the three-arm and two-arm scenarios. Additionally, a consort flow diagram is presented (Figure 4) illustrating the amalgamation of the two treatment arms. For the scope of this dissertation, I considered the two study arms (control and treatment) and exclusively interpret Table 6, which delineates the sample characteristics for the two study arms.

The study recruited 542 participants, and these were randomized into two conditions, intervention ($n=186$) and control ($n=356$). At baseline, the average age of women was 31 years across all study conditions. The intervention group had more women with postprimary education (137, 38.5%) than control group. About 34% of the women in the intervention group reported being HIV positive compared to 39% in the control group. The mean savings reported by the intervention group was Shs.334,558.2($\pm$500,921.6) compared to Shs.213377.8($\pm$255,280) in the control group and the HIV risk behavior was 92% in the control group compared to 87.4% in the intervention group. See Appendix A for a full table of characteristics for other variables used in this dissertation.

Figure 4

Kyaterekera Study Consort Flow Diagram
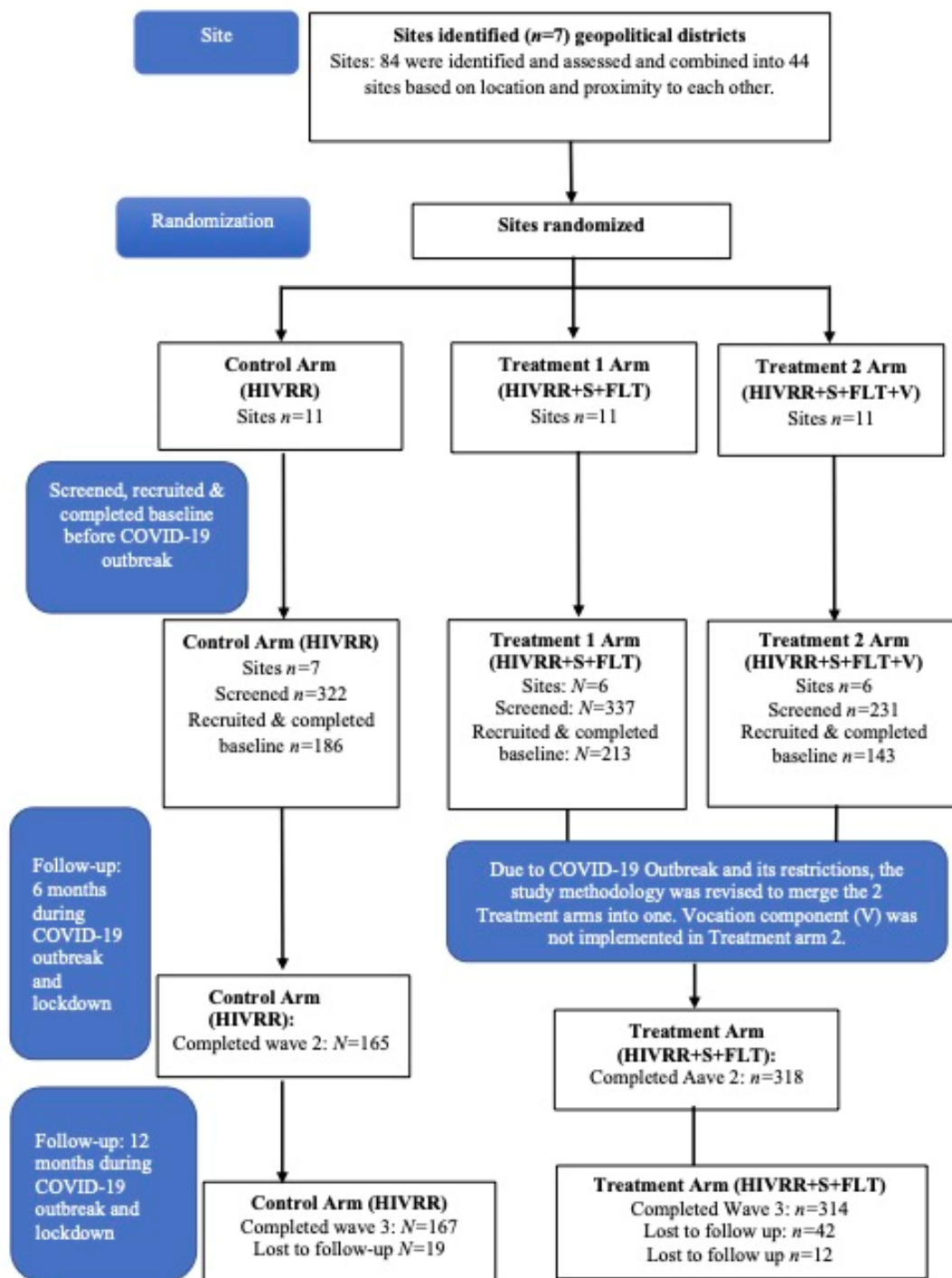
Note. Up to 12-month follow up.

Table 5

Sample Characteristics of the Sample Considered at Baseline (3 Study Arms)

Variable	Full sample	Control (HIVRR)	Treatment 1 (HIVRR+S+FLT)	Treatment 2 (HIVRR+S+FLT+V)
Number of participants	542	186	213	143
Proportion of total sample	100%	34.3%	39.3%	26.4%
Age (18–55 years)	31.37(±7.2)	31.24(±6.8)	31.91(±7.8)	30.74(±6.8)
Marital status				
Married	139(25.7%)	53(28.5%)	61(28.6%)	25(17.5%)
Separated	331(61.1%)	109(58.6%)	123(57.8%)	99(69.2%)
Single	72(13.3%)	24(12.9%)	29(13.6%)	19(13.3%)
Education level attained				
Primary	344(63.5%)	125(67.2%)	126(59.2%)	93(65%)
Postprimary	198(36.5%)	61(32.8%)	87(40.9%)	50(35%)
HIV				
Positive	191(35.7%)	73(39.3%)	80(38.8%)	38(26.6%)
Negative	344(64.3%)	113(60.8%)	126(61.2%)	105(73.4%)
Savings				
Money saved anywhere	260(48%)	90(48.4%)	106(49.8%)	64(44.8%)
Amount saved (Min/Max: 3000/3100000)	292611.2(±435269)	213377.8(±255280)	179798.1(±405543.2)	129915.4(±348719.3)
HIV risk behavior				
Yes				
No				

Note. Mean(SD) or n(%)

Table 6

Sample Characteristics of the Sample Considered at Baseline (2 Study Arms)

Variable	Full sample	Control (HIVRR)	Treatment (HIVRR+S+FLT)
Number of participants	542	186	356
Proportion of total sample	100%	34.3%	65.7%
Age (18–55 years)	31.37(±7.2)	31.24(±6.8)	31.44(±7.4)
Marital status			
Married	139(25.7%)	53(28.5%)	86(24.2%)
Separated	331(61.1%)	109(58.6%)	222(62.4%)
Single	72(13.3%)	24(12.9%)	48(13.5%)
Education level attained			
Primary	344(63.5%)	125(67.2%)	219(61.5%)
Postprimary	198(36.5%)	61(32.8%)	137(38.5%)
HIV			
Positive	191(35.7%)	73(39.3%)	118(33.8%)
Negative	344(64.3%)	113(60.7%)	231(66.2%)
Savings			
Money saved anywhere	260(48%)	90(48.4%)	170(47.8%)
Amount saved		213377.8(±25528	334558.2(±500921.
Min/Max: 3000/3100000	292611.2(±435269)	0)	6)
HIV risk behavior			
Yes	482(88.9%)	171(92%)	311(87.4%)
No	60(11.07)	15(8.1%)	45(12.6%)

Note. Mean(SD) or *n*(%)

Table 7 and Figure 5 present the main effect of the intervention, time, and interaction between time and intervention. There was a significant main effect for time ($\chi^2(2) = 78.70$, $p < .001$) but no significant effect for group ($\chi^2(1) = 1.08$, $p=0.298$). However, the group-by-time interaction effect was significant ($\chi^2(2) = 8.00$, $p=0.018$). Pairwise comparisons showed no

significant group difference observed at 6 months and 12 months (Table 8). However, there was a nonstatistically significant reduction in HIV risk behavior at 6 months for the women who received the economic empowerment compared to those who received HIVRR only as shown in Figure 5.

Table 7

Unstandardized OR and 95% CI for HIV Risk Behaviors Among WESW

Model Components	OR (95%CI)	p Value
Time $\chi 2$(df)	78.70(2)	<0.001
Baseline (reference)	0	0
6 months	0.23(0.13, 0.39)	<0.001
12 months	0.19(0.11, 0.32)	<0.001
Group $\chi 2$(df)	1.08(1)	0.298
HIVRR (reference group)	0	0
HIVRR+S+FLT	0.56(0.24, 1.28)	0.172
Group#Time $\chi 2$(df)	8.00(2)	0.018
6 month#HIVRR+S+FLT	1.12(0.51, 2.45)	0.772
12 month#HIVRR+S+FLT	1.95(0.98, 3.87)	0.055
Constant	21.00(11.35, 38.84)	<0.001
No of participants	542	
No. of observations	1506	

Figure 5

Predicted Probabilities of Women's HIV Risk Behavior With Adjusted Predictions of Time and

Group Interaction

Table 8

Pairwise Comparisons of Study Intervention Means for HIV Risk Behavior in Each Time Point

(Group-in-Time Simple Effects) Among WESW

		OR	95% *CI*
Time	Pairwise comparison		
6 months	HIVRR+S+FLT vs. HIVRR	0.63	0.31, 1.28
12 months	HIVRR+S+FLT vs. HIVRR	1.09	0.62, 1.92
Number of participants		542	
Number of observations		1506	

Aim 1b

Aim 1b was to evaluate the differential impact of the economic empowerment intervention on the HIV risk behavior by HIV status (positive and negative) of WESW.

This aim examined the differential impact of the economic empowerment intervention, on the HIV risk behavior of women based on their self-reported HIV status. Table 9 and Figures 6 and 7 present the main effect of the intervention—time and interaction between time and intervention for HIV-positive and -negative women respectively. There was a significant main effect for time ($\chi^2(2) = 32.23$, $p < 0.001$) but no significant main effect for group ($\chi^2(1) = 0.74$, $p = 0.391$) and the group-by-time interaction ($\chi^2(1) = 2.38$, $p = 0.304$) for HIV-positive WESW. Like HIV-negative women, there was a significant main effect for time ($\chi^2(2) = 35.76$, $p < 0.001$) and a nonsignificant main effect for group ($\chi^2(1) = 0.55$, $p = 0.459$) as well as the group-by-time interaction ($\chi^2(2) = 2.13$, $p < 0.345$). A pairwise comparison showed no significant group difference observed at 6 months and 12 months for both HIV-positive and -negative WESW (Table 10). However, there was a nonstatistically significant reduction in HIV risk behavior at 6 months for the women who received the economic empowerment compared to those who received HIVRR only as shown.
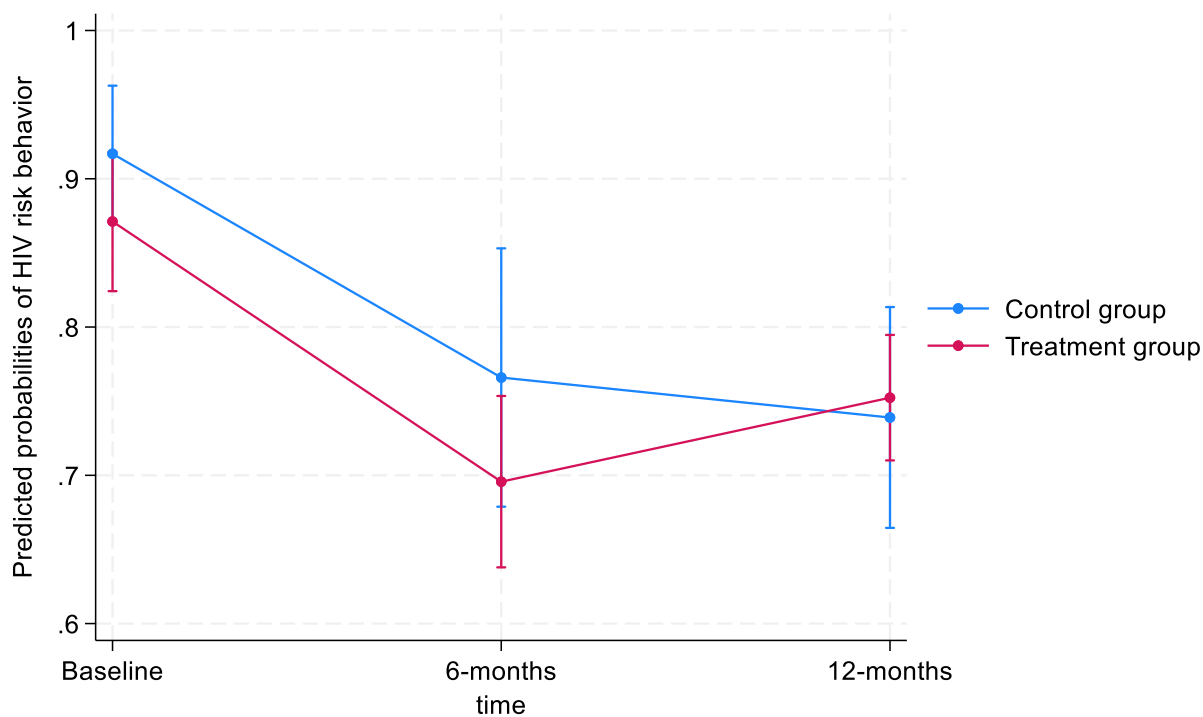
Table 9

HIV Risk Behaviors Among WESW by HIV Status

Model Components	HIV Positive WESW		HIV Negative WESW	
	OR (95%CI)	*p* Value	OR (95%CI)	*p* Value
Time χ2(df)	32.2(2)	<0.001	35.76(2)	<0.001
Baseline (reference group)	0	0	0	0
6 months	0.20(0.09, 0.43)	<0.001	0.26(0.13, 0.52)	<0.001
12 months	0.15(0.06, 0.40)	<0.001	0.23(0.08, 0.62)	0.004
Intervention χ2(df)	0.74(1)	0.391	0.55(1)	0.459
HIVRR (reference group)	0	0		
HIVRR+S+FLT	.43(0.11, 1.63)	0.215	0.66(0.29, 1.50)	0.324
Intervention#Time χ2(df)	2.38(2)	0.304	2.13(2)	0.345
6 month#HIVRR+S+FLT	1.67(0.61, 4.58)	0.314	0.87(0.37, 2.05)	0.751
12 month#HIVRR+S+FLT	2.45(0.75, 8.02)	0.138	1.84(0.58, 5.83)	0.303
Constant	16.04(4.99, 51.48)	<0.001	24.20 (11.13, 52.64)	<0.001
No of participants	218		367	
No. of observations	549		950	

Figure 6

Predicted Probabilities of HIV-Positive Women's HIV Risk Behavior
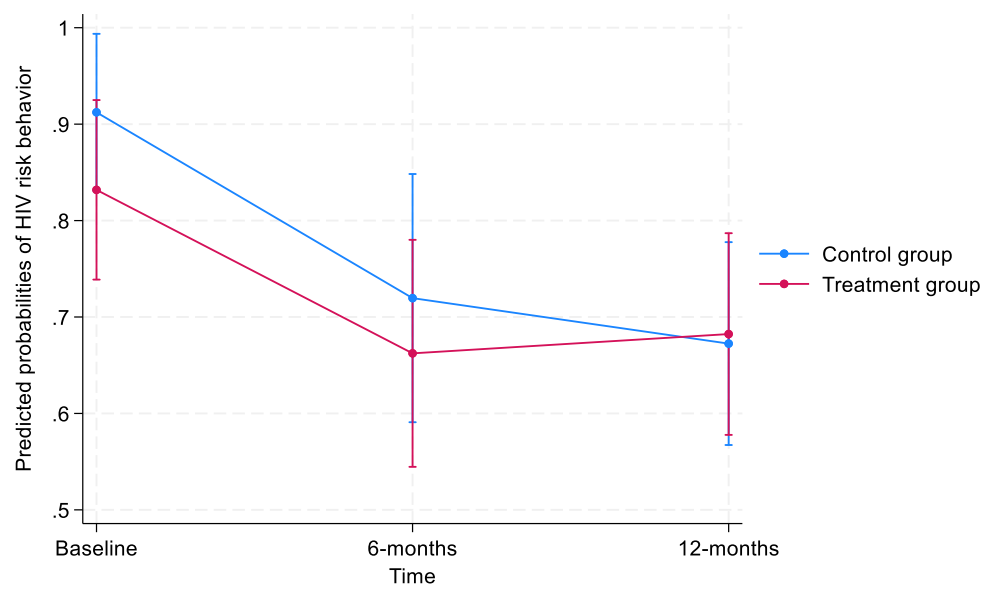
Note. Adjusted predictions of time and group interaction.

Figure 7

Predicted Probabilities of HIV-Negative Women's HIV Risk Behavior
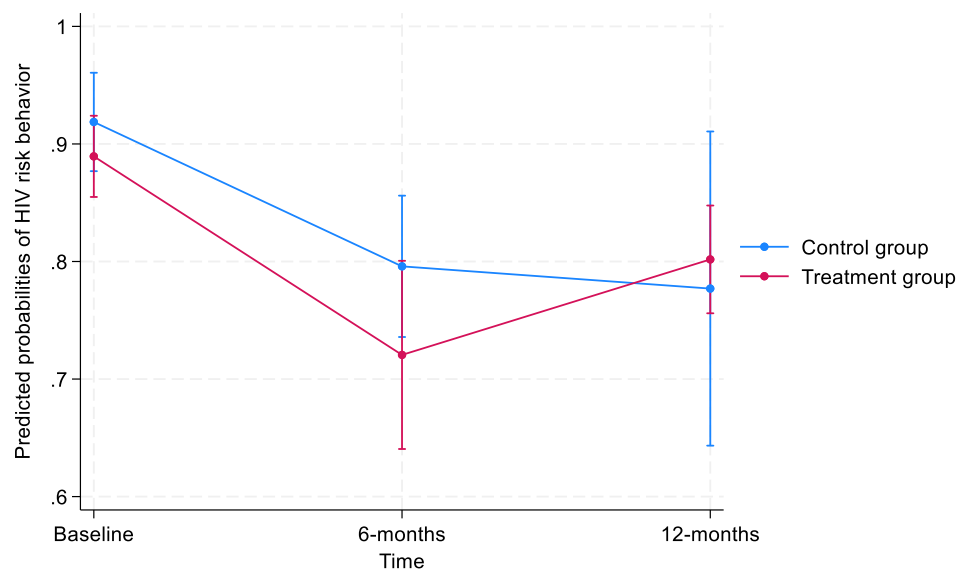
Note. Adjusted predictions of time and group interaction.

Table 10

Pairwise Comparisons of the Effect of the Intervention in Reducing HIV Risk Behavior Among

HIV Positive and Negative WESW

		HIV-Positive WESW		HIV-Negative WESW	
		OR	95% CI	OR	95% CI
Time	Pairwise comparison				
6 months	HIVRR+S+FLT vs. HIVRR	0.72	0.27, 1.94	0.58	0.28, 1.19
12 months	HIVRR+S+FLT vs. HIVRR	1.06	0.46, 2.41	1.22	0.41, 3.64
Number of participants		218		367	
Number of observations		549		950	

Aim 2

Aim 2 was to Examine the patterns of savings in relation to expenditure and HIV status

(positive and negative) among WESW.

Aim 2 focused on analyzing savings and expenditure patterns among WESW. The study

investigated whether increased savings were correlated with reduced expenditure over time. We

used a smaller subset of the women who participated in the economic empowerment

intervention, consisting of 163 women. These participants were provided with financial diaries

and recorded their daily financial expenditures for the initial 6 months (see Appendix 2 for a

photo of the financial diary used). The collected data were then entered into the study database.

A total of 261 participants received financial diaries and were instructed by the study team on

how to record their expenditures. The study team conducted monthly site visits to monitor and review the use of the financial diary booklets by the participants. By the onset of theCOVID-19 lockdown, the team had distributed booklets to 261 out of 356 women in the intervention group. After 6 months, the team was able to collect booklets from only 163 women. Reasons for nonreturn of the booklets included relocation from the study region, flooding at Lake Victoria, which damaged properties including the booklets of women residing there, and women who attended only one session of the FLT were unable to complete the financial diaries.

The baseline sociodemographic characteristics of this subset are presented in Table 11. In this reduced sample, 62% of the women were HIV negative, and 38% were HIV positive. The average age for the entire group was 32.23 years ($\pm$7.8). There was a significant ($p=0.001$) difference in mean age between those who were HIV negative ($M=30.34$, $SD=\pm7.3$) and those who were HIV positive ($M=35.30$, $SD=\pm7.6$). Additionally, there was a significant ($p=0.008$) difference in education level between HIV-negative women and HIV-positive women, with 48.5% of HIV-negative women having postprimary education compared to 27.42% for the HIV-positive women.

Table 11

Sample Characteristics of Women Who Completed Financial Dairies Data

Model Components	HIV Positive WESW		HIV Negative WESW	
	OR (95%CI)	*p* Value	OR (95%CI)	*p* Value
Time χ2(df)	32.2(2)	<0.001	35.76(2)	<0.001
Baseline (reference group)	0	0	0	0
6 months	0.20(0.09, 0.43)	<0.001	0.26(0.13, 0.52)	<0.001
12 months	0.15(0.06, 0.40)	<0.001	0.23(0.08, 0.62)	0.004
Intervention χ2(df)	0.74(1)	0.391	0.55(1)	0.459
HIVRR (reference group)	0	0		
HIVRR+S+FLT	.43(0.11, 1.63)	0.215	0.66(0.29, 1.50)	0.324
Intervention#Time χ2(df)	2.38(2)	0.304	2.13(2)	0.345
6 month#HIVRR+S+FLT	1.67(0.61, 4.58)	0.314	0.87(0.37, 2.05)	0.751
12 month#HIVRR+S+FLT	2.45(0.75, 8.02)	0.138	1.84(0.58, 5.83)	0.303
Constant	16.04(4.99, 51.48)	<0.001	24.20 (11.13, 52.64)	<0.001
No of participants	218		367	
No. of observations	549		950	

Note. *N*=163; Mean (*SD*) or *n*(%).

The women's expenditures, as recorded in their financial diaries, were categorized into 15 expense codes: food, housing, cosmetics, toiletries, clothing, communication, transportation, education, health, investments, kitchenware, utilities, leisure, drugs, and other expenses. For the sake of clarity in this dissertation, these 15 codes were consolidated into six categories: food, housing, health, education, sex work, and other living expenses. Women documented their expenditures and incomes in Ugandan shillings. For this dissertation, these figures were converted to USD using an exchange rate of 3570 shillings to the dollar (World Bank, 2024b). This income assessment included monthly deposits made to savings accounts with commercial

banks partnered in the study, the matched savings contributed to the same accounts by the research team, and the monthly income reported in the quantitative survey.

The analysis of women's income and expenditure in the first 6 months revealed that the estimated total income for this group amounted to $54,145 per month, ranging from $47,719.01 to $60,571.3. The mean income was $55.36. In terms of expenditure, the total spent was $43,842.06, with a range between $37,742.53 and $49,941.59 per month with a mean of $44.83. Notably, in this group, a significant portion of their income—46.06%—was allocated to food expenses, followed by other miscellaneous expenses, which accounted for 27.91% of their expenditures. Sex work-related expenses constituted the smallest portion at 3.85%. Overall, the total sample of women who completed the financial diaries data reported a monthly income exceeding their monthly expenditure, as illustrated in Figure 8. Tables 12 and 13 present data on the total estimated income and expenditure, as well as the mean income and expenditure in this subsample.

Table 12

Total Income and Expenditure for Women Who Completed Financial Dairies Data

	Month1	Month2	Month3	Month4	Month5	Month6	All months	% of all exp
Total income	9532.46	8746.12	8816.68	8925.03	9162.88	8961.99	54145.15	
Total expenditure	1332.36	5889.98	9768.96	8424.61	10677.55	7748.60	43842.06	100.00%
% total income	13.98%	67.34%	110.80%	94.39%	116.53%	86.46%	80.97%	
Expense categories								
Food expenditure	810.19	2376.22	4450.56	3948.49	4828.89	3778.49	20192.84	46.06%
Sex work expenditure	48.86	175.05	408.80	275.14	394.33	387.41	1689.59	3.85%
Housing expenditure	57.69	480.45	1079.20	933.46	1108.73	1107.19	4789.40	10.92%
Other living expenditure	297.12	2163.96	2960.10	2139.35	2968.78	1705.60	12234.91	27.91%
Education expenditure	57.54	441.45	208.73	588.53	984.73	481.26	2762.23	6.30%
Health care expenditure	38.30	252.85	661.57	539.64	392.09	288.63	2173.09	4.96%

Table 13

Mean Income and Expenditure for Women Who Completed Financial Dairies Data.

	Month1	Month2	Month3	Month4	Month5	Month6	All months	% of all exp
Mean income	58.48	53.66	54.09	54.75	56.21	54.98	55.36	
Mean expenditure	8.17	36.13	59.93	51.68	65.51	47.54	44.83	100.00%
% total income	13.98%	67.34%	110.80%	94.39%	116.53%	86.46%	80.97%	
Expense categories								
Food Expenditure	4.97	14.58	27.30	24.22	29.63	23.18	123.88	46.06%
Sex work expenditure	0.30	1.07	2.51	1.69	2.42	2.38	10.37	3.85%
Housing expenditure	0.49	2.95	6.62	5.73	6.80	6.79	29.38	10.92%
Other living expenditure	1.82	13.28	18.16	13.12	18.21	10.46	75.06	27.91%
Education expenditure	0.35	2.71	1.28	3.61	6.04	2.95	16.95	6.30%
Health care expenditure	0.11	1.55	4.06	3.31	2.41	1.77	13.21	4.91%

Figure 8

Mean Income Vs. Expenditure for Women Who Completed Financial Dairies Data
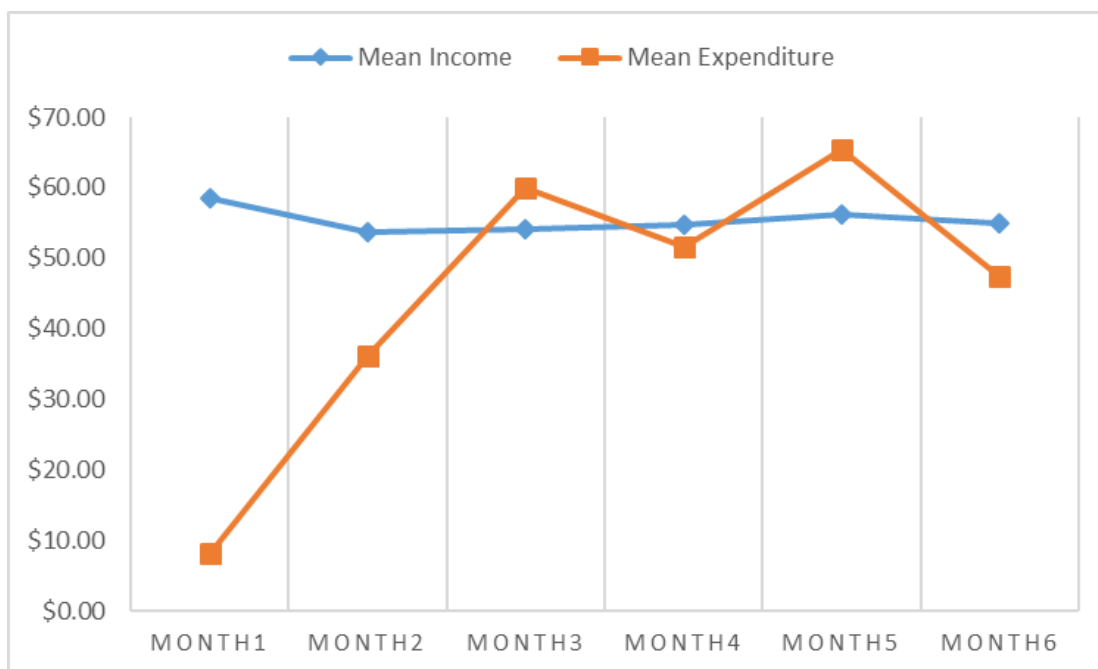
I analyzed the mean income and expenditure of women based on their HIV status (see Tables 14, 15, and 17, and Figures 9 and 10). HIV-negative women earned higher incomes, with an average of $58.05 (Table 14). In contrast, HIV-positive women reported lower incomes, with an average of $50.99 (Table 15). Notably, HIV-positive women allocated a greater percentage (6.93%) of their expenditures to healthcare, compared to HIV-negative women, who dedicated 3.74% of their expenses to the same category. On the other hand, HIV-negative women allocated a larger portion of their expenditures to food (47.51%) compared to HIV-positive women (42.70%). Expenditures on sex work remained relatively consistent across both groups. In summary, HIV-negative women demonstrated a consistently higher net income over time when compared to HIV-positive women, as illustrated in Figure 9 and Figure 10.

Table 14

Estimated Monthly Total and Mean Income Expenditures for Women Who Completed Financial Dairies Data

| Period | Estimated Income (USD) | | | | | | Estimated Expenditure (USD) | | | | | |
| | Overall | | HIV-Negative | | HIV-Positive | | Overall | | HIV-Negative | | HIV-Positive | |
	Total Income	Mean Income	Total Income	Mean Income	Total Income	Mean Income	Total Exp.	Mean Exp.	Total Exp.	Mean Exp.	Total Exp.	Mean Exp.
Month1	9532.46	58.48	6160.62	61.00	3371.84	54.38	1332.36	8.17	850.65	8.42	481.71	7.77
Month2	8746.12	53.66	5599.67	55.44	3146.45	50.75	5506.07	33.78	3071.84	30.41	2434.23	39.26
Month3	8816.68	54.09	5785.86	57.29	3030.82	48.88	9617.77	59.00	5204.39	51.53	4413.38	71.18
Month4	8925.03	54.75	5790.34	57.33	3134.69	50.56	7893.63	48.43	5389.26	53.36	2504.37	40.39
Month5	9162.88	56.21	5946.71	58.88	3216.17	51.87	9750.36	59.82	6056.92	59.97	3693.44	59.57
Month6	8961.99	54.98	5895.33	58.37	3066.66	49.46	7324.87	44.94	5059.13	50.09	2265.74	36.54

Note. Grouped by HIV status.

Table 15

Mean Income and Expenditure by Expense Category for HIV-Negative Women Who Completed Financial Dairies Data

	Month1	Month2	Month3	Month4	Month5	Month6	All Months	% of All Exp
Mean income	61.00	55.44	57.29	57.33	58.88	58.37	58.05	
Mean expenditure	8.42	30.41	51.53	53.36	59.97	50.09	42.30	100.00%
% total income	13.81%	54.86%	89.95%	93.07%	101.85%	85.82%	72.86%	
Expense categories								
Food Expenditure	5.48	12.66	25.53	27.69	30.16	26.26	127.77	47.51%
Sex work expenditure	0.42	1.09	2.26	2.04	2.44	2.35	10.61	3.94%
Housing expenditure	0.64	2.49	6.43	5.73	5.48	7.46	28.22	10.49%
Other living expenditure	1.36	12.73	15.33	14.57	19.69	11.78	75.45	28.05%
Education expenditure	0.28	2.73	1.21	4.30	3.61	3.42	15.54	5.78%
Health care expenditure	0.25	1.17	1.70	3.05	1.92	1.97	10.07	3.74%

Table 16

Mean Income and Expenditure by Expense Category for HIV Positive Women Who Completed Financial Dairies Data

	Month1	Month2	Month3	Month4	Month5	Month6	All Months	% of all exp
Mean income	54.38	50.75	48.88	50.56	51.87	49.46	50.99	
Mean expenditure	7.77	39.26	71.18	40.39	59.57	36.54	42.45	100.00%
% total income	14.29%	77.36%	145.62%	79.89%	114.84%	73.88%	83.27%	
Expense categories								
Food Expenditure	4.14	17.70	30.20	18.58	28.76	18.17	117.54	43.70%
Sex work expenditure	0.11	1.05	2.90	1.12	2.38	2.41	9.97	3.71%
Housing expenditure	0.25	3.70	6.94	5.72	8.95	5.71	31.27	11.63%
Other living expenditure	2.58	14.17	22.77	10.77	15.82	8.32	74.43	27.67%
Education expenditure	0.48	2.68	1.39	2.50	10.00	2.19	19.23	7.15%
Health care expenditure	0.21	2.17	7.89	3.73	3.19	1.45	18.65	6.93%

Figure 9

Mean Monthly Expenditure for Women Who Completed Financial Dairies Data
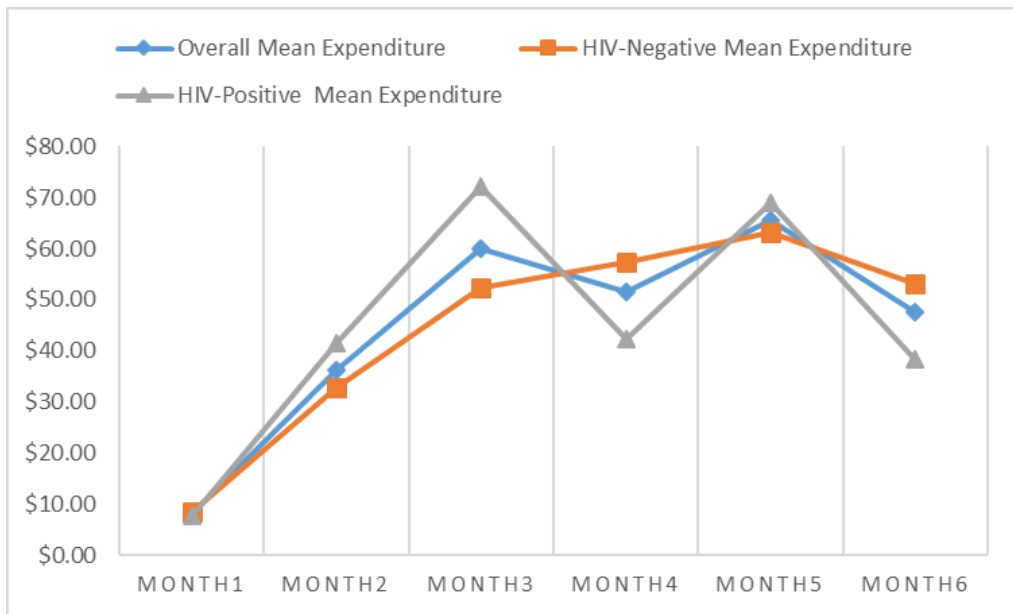
Note. Grouped by HIV status

Figure 10

WESW's Mean Monthly Income Versus Mean Monthly Expenditure
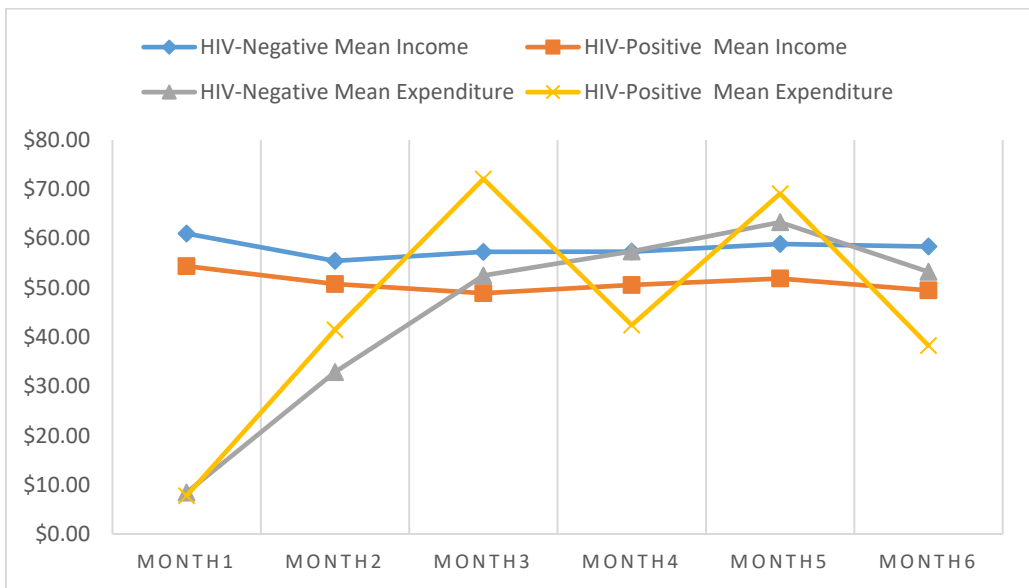
Note. Grouped by HIV status

Aim 3

Aim 3 was to examine the association between savings, savings expectations, and access to savings institutions among WESW in relation to their HIV status.

This aim examined the predictors of savings among WESW in relation to their HIV status. I mainly focused on women's saving expectations and access to saving institutions as the main predictors. For women who were HIV positive, saving expectations and access to saving institutions were not statistically significant. In the unadjusted model. In the adjusted model, education was significantly associated with savings. Women with postprimary education had increased savings compared to those with primary education (β=122583.5; 95% *CI:* 16922.86, 228244.10, *p<0.023*) (see Table 17).

For HIV-negative women, the results are presented in Table 18. From the analysis, high scores of savings expectations were associated with increased savings for women (β=5940.38; 95% *CI:* 2444.44, 9436.33, *p<0.001*). The intervention was also statistically significant, showing an increase in women's savings (β=117899.90; 95% *CI:* 47185.69, 188614.10, *p<0.001*). The results were similar to the adjusted model where high scores of savings expectations (β=4853.24; 95% *CI:* 1846.71, 7859.77, *p<0.002*) and the intervention (β=116208.80; 95% *CI:* 48353.43, 184064.30, *p<0.001*) were statistically significant. For the adjusted model, social support was statistically significant. Women with high scores of social support had increased savings (β=2092.09; 95% *CI:* 732.16, 3452.01, *p<0.003*).

Table 17

Unadjusted and Adjusted Regression Coefficients and 95% Confidence Intervals for Savings Among HIV Positive WESW

Variable	Unadjusted		Adjusted	
	Coef.(CI)	*p* Value	Coef.(CI)	*p* Value
Saving expectation	2215.53(-3219.25, 7650.31)	0.424	3782.725(-3209.67, 10775.12)	0.289
Distance to nearest bank (*Ref: <2km*)				
>2km	-61406.55(-123944.60, 1131.51)	0.054	-47337.81(-104836.50, 10160.92)	0.106
Intervention	73217.55(-13518.18, 159953.30)	0.098	72589.95(-13816.50, 158996.4)	0.100
Control variables				
Marital status (Ref: Married)				
Separated			31462.32 (-36482.13, 99406.76)	0.364
Single			188180.7 (-33549.32, 409910.8)	0.096
Education (Ref: Primary)				
Postprimary			**122583.5 (16922.86, 228244.10)**	**0.023**
Gender norms			3911.307 (-4880.36, 12702.97)	0.383
Community satisfaction			-7254.884 (-22196.85, 7687.08)	0.341
Social support			1395.573 (-608.75, 3399.90)	0.172
Sex work stigma			118.2747 (-2842.88, 3079.43)	0.938
No of participants	218			
No. of observations	549			

Table 18

Unadjusted and Adjusted Regression Coefficients and 95% Confidence Intervals for Savings Among HIV Negative WESW

Variables	Unadjusted		Adjusted	
	Coef.(CI)	*p* Value	Coef.(CI)	*p* Value
Saving expectation	**5940.38(2444.44, 9436.33)**	**0.001**	**4853.24(1846.71, 7859.77)**	**0.002**
Distance to nearest bank				
(*Ref: <2km*)				
>2km	-14343.17(-78289.72, 49603.37)	0.659	-20726.24(-84778.06, 43325.58)	0.542
Control variables				
Intervention	**117899.90(47185.69, 188614.10)**	**0.001**	**116208.80(48353.43, 184064.30)**	**0.001**
Marital status (*Ref: Married*)				
Separated			-22524.46(-57060.44, 12011.52)	0.201
Single			-31673.54(-94633.03, 31285.94)	0.324
Education (Ref: Primary)				
Postprimary			37131.74(-10428.29, 84691.78)	0.126
Gender norms			-945.78(-10231.15, 8339.57)	0.842
Community satisfaction			-145.87(-3879.40, 3587.65)	0.939
Social support			**2092.09(732.16, 3452.01)**	**0.003**
Sex work stigma			-1485.29(-3382.06, 411.47)	0.125
No of participants	367			
No. of observations	950			

Aim 4

Aim 4 was to examine the cost and cost-effectiveness of economic behavior change among WESW in Uganda.

Costing of the Intervention

Table 19 and Figure 11 illustrate the per participant costs categorized by cost type and segmented by study arm with the control group (HIVRR, $n=186$) and the intervention group (HIVRR+S+FLT, $n=356$) using the intent-to-treat (ITT) sample. The per participant costs in the control group were estimated at $183, and those in the intervention group were calculated at $588. Consequently, the incremental cost associated with the intervention group in comparison to the control group amounted to $405 per participant. In both study groups, personnel expenses constituted the majority of the total costs, followed by program overhead. In the intervention group, the primary cost drivers, after personnel and program overhead expenses, were the costs related to financial management workshops and IDAs. Conversely, for the control group, the costs associated with HIVRR workshops were the primary cost contributors following personnel and program overhead expenses.

Table 20 and Figure 12 display the per participant costs categorized by cost type and study arm, using the treatment on the treated (TOT) sample. These figures are grounded in the actual number of WESW who participated in each study group, resulting in more conservative cost estimates. Per participant cost estimates derived from the TOT sample were consequently higher in both study groups when compared to estimates calculated using the ITT sample, reaching $323 for the control group and $1,435 for the intervention group. The incremental cost of the intervention group over the control group amounted to $1,112 per participant. For a

comparison of per participant costs by study group through different analytical methods, please
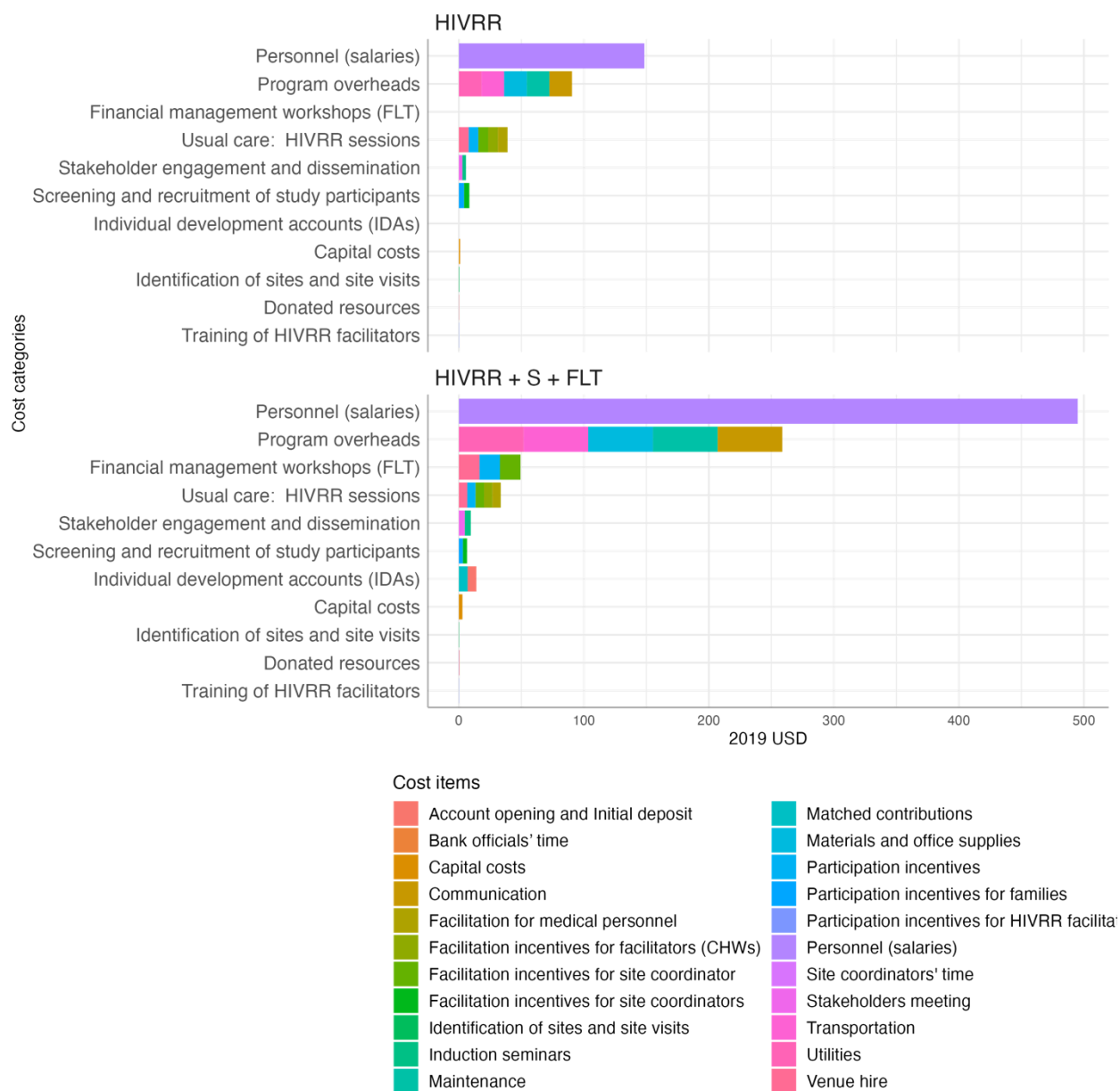
refer to Figure 13.

Table 19

Per Participant Costs of the Kyaterekera Intervention by Study Arm (ITT Sample)

Costs	Control Group	Intervention Group
Personnel (salaries)	532,266	1,774,953
Identification of study sites and site visits	1,203	807
Facilitation incentives for site coordinators	1,203	807
Screening and recruitment of study participants	15,035	11,725
Participation incentives for study participants	13,402	10,575
Facilitation incentives for site coordinators	1,632	1,150
Usual care: HIVRR sessions	27,933	24,033
Participation incentives for study participants	14,815	13,191
Facilitation incentives for HIVRR facilitators	7,651	6,977
Facilitation incentives for site coordinators	2,444	891
Facilitation for medical personnel	989	722
Venue rental	2,034	2,252
Individual development accounts	-	25,082
Account opening and initial deposits	-	8,315
Matched contributions	-	16,766
Financial literacy training sessions	-	58,902
Participation incentives for study participants	-	54,310
Facilitation incentives for site coordinators	-	1,958
Venue rental	-	2,634
Training of HIVRR facilitators	567	542
Participation incentives for HIVRR facilitators	567	542
Program overheads	64,885	185,469
Utilities	4,685	11,954
Transportation	47,410	138,744
Communication	2,638	5,105
Maintenance	7,113	22,475
Materials and office supplies	3,039	7,190
Stakeholder engagement and dissemination	10,183	17,129
Stakeholder meetings	3,569	13,823
Induction seminars	6,614	3,307
Capital costs	3,599	10,264
Total costs	656,938	2,108,424
Total costs (in 2019 USD)	183	588

Note. All costs are in 2019 Ugandan shillings unless otherwise indicated. Control group: HIVRR=HIV risk reduction (*n*=300); intervention group: HIVRR+S+FLT (*n*=600).

Figure 11

*Cost per Participant Breakdown by Study Arm Using the ITT Sample*

Table 20

*Per Participant Costs of the Kyaterekera Intervention by Study Arm (TOT Sample)*

Costs	Control Group	Intervention Group
Personnel (salaries)	941,065	4,233,807
Identification of study sites and site visits	2,135	1,497
Facilitation incentives for site coordinators	*2,135*	*1,497*
Screening and recruitment of study participants	26,614	25,008
Participation incentives for study participants	*23,725*	*22,567*
Facilitation incentives for site coordinators	*2,889*	*2,440*
Usual care: HIVRR sessions	49,415	56,703
Participation incentives for study participants	*26,227*	*29,459*
Facilitation incentives for HIVRR facilitators	*13,523*	*16,552*
Facilitation incentives for site coordinators	*4,320*	*2,355*
Facilitation for medical personnel	*1,750*	*1,750*
Venue rental	*3,595*	*6,587*
Individual development accounts	-	108,250
Account opening and initial deposits	-	*23,916*
Matched contributions	-	*84,334*
Financial literacy training sessions	-	167,467
Participation incentives for study participants	-	*152,938*
Facilitation incentives for site coordinators	-	*6,179*
Venue rental	-	*8,350*
Training of HIVRR facilitators	1,006	1,006
Participation incentives for HIVRR facilitators	1,006	1,006
Program overheads	114,672	489,832
Utilities	*8,273*	*37,218*
Transportation	*83,805*	*350,964*
Communication	*4,650*	*20,922*
Maintenance	*12,581*	*56,602*
Materials and office supplies	*5,363*	*24,127*
Stakeholder engagement and dissemination	18,059	34,588
Stakeholder meetings	*6,325*	*28,457*
Induction seminars	*11,734*	*6,131*
Capital costs	6,360	28,614
Total costs	1,162,348	5,146906
Total costs (in 2019 USD)	323	1,435

Note. Control group: HIVRR (*n*=186); intervention group: HIVRR+S+FLT (*n*=356). All costs are in 2019 Ugandan shillings unless otherwise indicated HIVRR=HIV risk reduction.

Figure 12

Cost per Participant Breakdown by Study Arm Using the TOT Sample
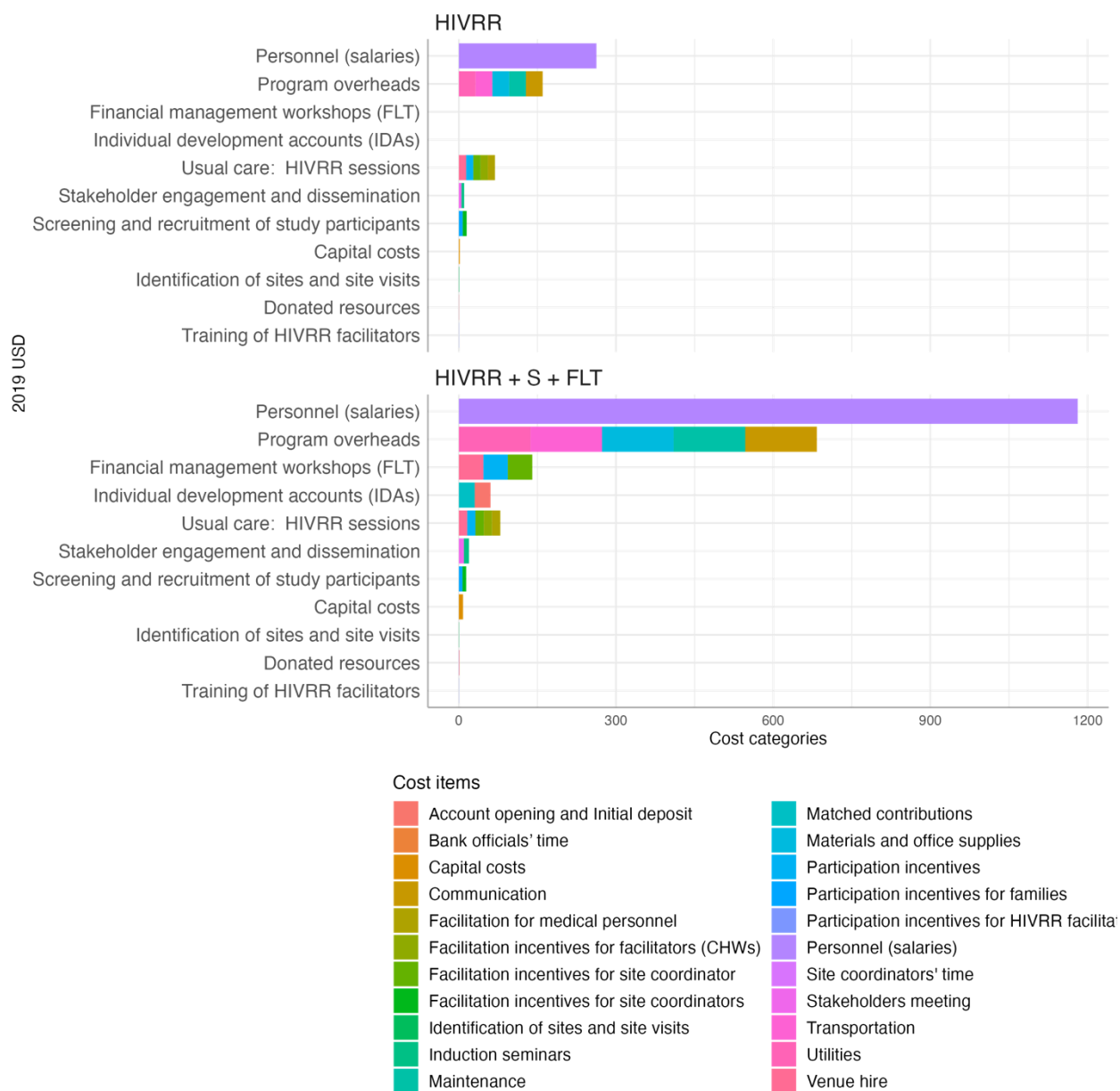
Figure 13

Per Participant Costs by Study Arm per Analytical Method
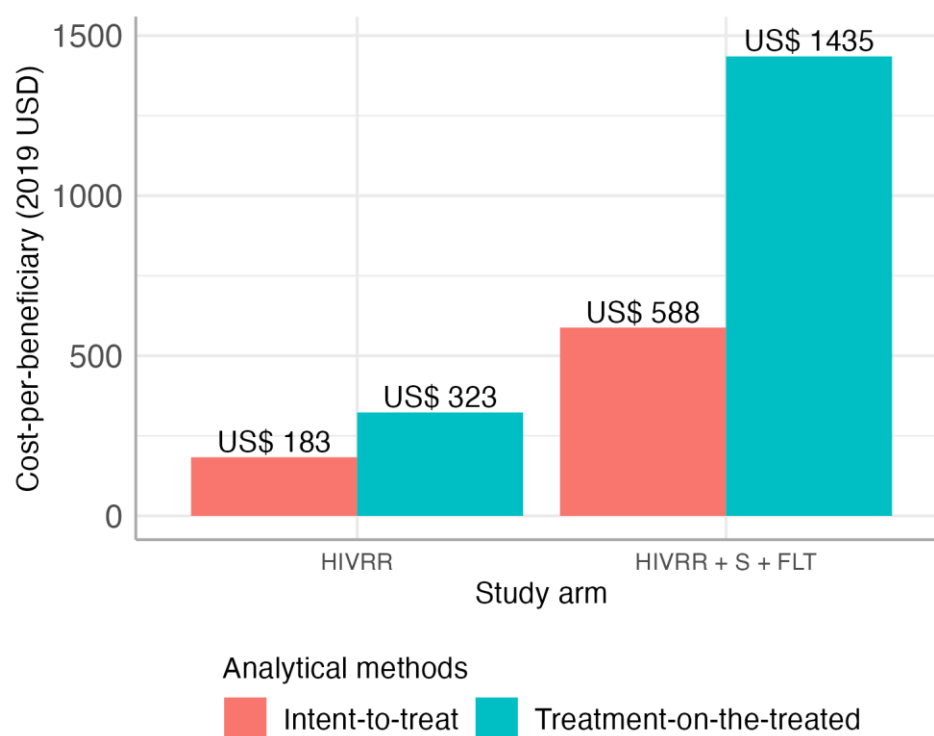
Cost-Effectiveness of the Intervention

Using costing results in Table 21, the cost of the intervention relative to the control group was $847 ($1435 - $588 = $847) and the effect of the intervention relative to the control group as presented in Table 8 was 1.95; however, this cost was not statistically significant. Therefore, the cost-effectiveness ratio calculated is 86.87 (43.77, 172.85) with a 0.2 standard deviation increase ($847/1.95x0.2 =$86.87). Because the effect was not significant, the intervention was strictly dominated and not cost-effective, therefore no need to calculate ICER.

Chapter 7: Discussion

Introduction

This study was centered on four aims. Aim 1 comprised two parts: Aim 1a investigated the short and midterm effects of an economic empowerment intervention on the HIV risk behavior of 542 WESW who were recruited in the Kyaterekera study. The findings of a multilevel logistic regression indicated a significant main effect of time and group by time interaction. However, there was no significant main effect for group. The results showed no difference in groups at both at the 6-month and 12-month follow-up time points.

Aim 1b explored the short and midterm impact of the intervention on women's HIV risk behavior based on their HIV status (positive and negative). Multilevel logistic regression models were applied separately for HIV-positive and HIV-negative women. For HIV-positive WESW, the results demonstrated a significant main effect for time and nonsignificant amin effect for group and group and time interaction. This was the same for the HIV-negative women. A pairwise comparison showed no significant difference in groups at both 6- month and 12 months follow-up points.

Aim 2 focused on a subgroup of the sample ($n=165$), women in the intervention group who received financial diaries and recorded their expenditures for the first 6 months. The objective of this analysis was to investigate the income and expenditure patterns of women in the context of their HIV status. The findings revealed that, overall, women had monthly incomes that surpassed their monthly expenses. However, when women were categorized based on their HIV status, it became evident that HIV-negative women consistently achieved a higher net income over time in comparison to HIV-positive women.

Aim 3 investigated the influence of women's saving expectations and their access to saving institutions as predictors of savings, with a focus on their HIV status. The results revealed that HIV-positive women who reported travelling more than 2 kilometers to the nearest commercial bank had lower mean savings compared to those who had to travel less than 2 kilometers. However, the intervention did not show any statistically significant impact on their savings. Conversely, HIV-negative women with high scores in savings expectations showed a statistically significant increase in their savings, and the intervention exhibited a significant effect in enhancing their savings.

Aim 4 centered on assessing the cost and cost-effectiveness of the intervention. Participant costs were computed using both the ITT and the TOT methods. The estimated per participant costs were $185 and $588 for the control and intervention groups, respectively, using the ITT approach. Using the TOT method, the estimated costs were $323 for the control group and $1435 for the intervention group. The results showed no effectiveness of the intervention on HIV risk behaviors among WESW; therefore, an incremental cost-effectiveness ratio was not calculated.

Discussion of Findings

Short and Midterm Efficacy

In alignment with prior research, the intervention demonstrated a significant short-term impact on the reduction of HIV risk behaviors, however, there was no significant impact at the midterm. In a related study conducted in Tanzania by Mantsios et al. (2018), specifically in the Iringa region, which bears a heavy burden of HIV, an economic empowerment intervention using community savings groups was assessed for its impact on HIV prevention and behavioral change among women engaged in commercial sex work. Mantsios et al.'s findings highlighted

an augmentation in financial support, driven by increased savings, with women setting savings objectives primarily focused on asset building. Additionally, the research indicated that the economic empowerment of WESW bolstered individual agency, leading to a reduction in risky sexual behaviors (Mantsios et al., 2018). The dissertation's findings of a nonsignificant effect of the intervention on women's HIV risk behavior could be attributed to various factors, notably the impact of COVID-19. The disruption caused by the pandemic, as detailed in Chapter 4, led to modifications in the study's methodology. A significant number of women in the intervention group did not complete the financial literacy sessions, which could have been pivotal in enhancing their financial management, potentially reducing their reliance on sex work and increasing condom use. Additionally, the nonimplementation of vocational skills training, originally planned for Treatment Group 2 alongside HIVRR sessions, MSAs, and FLT sessions, further influenced by the pandemic-related methodology revisions, could have impacted the study's outcomes. Acquiring vocational skills would have enabled women to seek employment in various sectors, reducing their dependence on sex work and lowering their HIV risk.

Moreover, the disruption of sex worker programs in Africa, leading to a scarcity of HIV prevention and sexual and reproductive health services, as noted in the UNFPA report (UNFPA, 2021), likely contributed to the intervention's limited effectiveness during the COVID-19 pandemic. The economic impact of the pandemic was significant, with sex workers unable to work due to reduced clients. Furthermore, the higher income associated with unprotected sex, as opposed to protected sex (Sikhosana & Mokgatle, 2021), compounded by poverty and a lack of sexual and reproductive health services, likely deterred women from using condoms during the COVID-19 period.

Impact of the Economic Empowerment Intervention on HIV-Risk Behavior by HIV Status

People living with HIV in SSA encounter various challenges, including the disclosure and acceptance of their HIV status, adherence to medication, and economic burdens, among other difficulties (Tarantino et al., 2020; Van Wyk & Davids, 2019). Notably, the economic burden is frequently identified as a significant obstacle to accessing healthcare. WESW are not exempt from these economic challenges. A systematic review exploring the treatment experiences of HIV-positive WESW in SSA indicated that WESW often face financial obstacles when initiating antiretroviral therapy due to the costs associated with regular testing and hospital visits. Additionally, sustaining the necessary nutritious diets required for effective HIV medication can be financially burdensome (Lancaster et al., 2016). HIV-positive WESW often find themselves compelled to travel long distances from their communities to access the medical services they require to manage their HIV status. This necessity arises from the pervasive discrimination and stigma they face in their local communities (Akullian et al., 2016). This arrangement not only poses a logistical challenge but also imposes significant financial burdens on their already strained resources. My research findings revealed no significant impact of the economic intervention on reduction of HIV risk behavior by HIV status. This lack of impact could be attributed to the disruption of the study, which led to modification of the methodology as and the scarcity of HIV prevention services (UNFPA, 2021). Another potential reason is the lowered power from splitting the sample into HIV-positive and HIV-negative subsamples.

Patterns of Savings in Relation to Expenditure and HIV Status

Analysis of the financial diaries data for women revealed that their income levels were modest, and their expenses fluctuated over the 6-month period. On average, their monthly income amounted to $55.36, falling below the monthly Gross National Income per capita for

adults in Uganda, which is $61.70 (World Bank, [ca. 2024a]). Notably, HIV-positive women had

an average income of $50.99, and HIV-negative women had a slightly higher average income of

$58.05. This difference is significant given that the median household income in Uganda for the

financial year 2019/2020 was $53.22 (Uganda Bureau of Statistics, 2021b). Over a period, this

$7 difference in income meant that HIV-negative women who engaged in sex work had a higher

net income compared to their HIV-positive counterparts. In a country where the median

household monthly income is $53.22, this $7 difference is noteworthy as it could translate into a

meaningful impact on their standard of living.

A substantial portion of women's income was allocated to food and other living

expenses, with relatively minimal expenditures directed towards healthcare. These findings align

with previous studies exploring the incomes and expenditures of WESW (Agrawal Sagtani et al.,

2015; Lorenzetti et al., 2021; Namey et al., 2018). This supports the earlier discussion, indicating

that HIV-positive WESW have limited income available for savings due to their higher

healthcare-related expenses and reduced economic activities resulting from the physical impact

of the HIV virus on their bodies when compared to HIV-negative WESW. My results reveal that

HIV-positive WESW allocated a significant portion of their income to healthcare, specifically

6.93%, in contrast to HIV-negative WESW at 3.74%. Ritchwood et al.'s (2017) study, conducted

in the United States between 2002 and 2011, on the healthcare expenditures of people living with

HIV found that the total expenditure was $31,147, estimated to be 900% higher than those

without HIVClick or tap here to enter text.. In LMICs, governments bear substantial costs for

HIV treatment in comparison to other infectious diseases. Between 2000 and 2016, government

spending on HIV care in LMICs increased from $1.1 billion to $7.2 billion USD (Haakenstad et

al., 2019). This increase emphasizes the financial burden that HIV care places not only on WESW but also on the general population, governments, and international funding agencies.

Association Between Savings, Savings Expectations, and Access to Savings Institutions

HIV Positive

The findings revealed a significant correlation between the savings of HIV-positive WESW and their education level. In the adjusted model, a higher level of education was found to be a significant factor associated with increased savings among HIV-positive WESW. Education plays a pivotal role in an individual's economic growth and development. It significantly influences economic development by equipping individuals with additional skills and improved access to resources that can drive positive changes in communities. Educated individuals are better positioned to explore employment opportunities that yield higher incomes. Moreover, education empowers people to make informed financial decisions, including saving and investing in assets for long-term gains, as they can effectively read and interpret economic development records. These benefits stemming from education are not exclusive to HIV-positive WESW.

HIV Negative

The model for HIV-negative WESW showed that high scores of savings expectations were associated with increased savings for women. In other words, HIV-negative WESW with set savings goals are more likely to increase their savings over time. My study findings are similar to other research findings which have showed setting saving goals encourages a culture of savings (Fry et al., 2008; Soman & Zhao, 2011). This finding could be connected to the increase in savings among HIV-negative WESW, which is closely tied to their sense of optimism for the future and their determination to leave the sex work industry. The act of amassing savings necessitates a clear and organized mindset with established targets. Without a well-defined

savings plan, financial aspirations may remain elusive. Setting savings goals simplifies the process of making financial sacrifices and adhering to a budget by providing a tangible objective to strive for. These goals serve as a constant reminder of one's overarching, long-term objectives, thus helping one stay focused. Moreover, these savings goals infuse financial efforts with purpose and energy, bolstering commitment to your investment strategy.

In the adjusted model, a notable correlation was observed between social support and increased savings among HIV-negative WESW. Women who scored high on measures of social support tended to have higher savings. Research has consistently demonstrated a link between social support and reduced financial stress. Individuals with stronger social support networks often experience improved psychological well-being. This enhanced psychological well-being equips them with the mental stability to focus on economic activities, leading to increased income and greater savings over time.

Cost and Cost-Effectiveness of Economic Behavior Change

Cost of the Intervention

This study demonstrated that adding an economic empowerment component to the conventional HIVRR intervention could enhance it at an incremental cost of $400 to $1200 per person. Consequently, the estimated per participant cost for this combined intervention varied from $185 to $1435 (see Figure 13). Although the upper limit of this cost range appears somewhat higher than that of other combined interventions designed to mitigate HIV risks in various target groups, where the per beneficiary cost ranged from $400 to $900, this study's estimate still broadly falls in a comparable cost range to those of other combined interventions (Redfern et al., 2019; Sim et al., 2014; Tozan, Capasso, Namatovu, et al., 2022; Tozan, Sun, et al., 2019).

The primary factors contributing to the elevated cost estimates included the initial capital investment in establishing the IDA and providing matching savings, as well as the expenses associated with personnel salaries and program-related transportation. Given the increased mobility and scattered distribution of hot spot locations among WESW, it was expected that there would be a higher cost associated with personnel and transportation for program operations (Kate Grabowski et al., 2020; Ssewamala et al., 2019). Moreover, the challenges of retaining WESW in the program after their initial recruitment substantially reduced the denominator in the total cost of ownership analysis, further driving up the upper limit of the program cost. These unique factors that contributed to the higher cost of Kyaterekera should be taken into consideration by programmers planning to implement a similar intervention targeting WESW.

This study employed a bottom-up, activity-based microcosting approach to meticulously calculate the economic costs of a combination intervention for WESW across five districts in Uganda, considering the perspective of the program provider. In essence, the costs estimated in this study were based on real resources used in the program, which were systematically recorded by trained staff using a standardized tool (Sanders et al., 2016).

Unlike the top-down macrocosting approach, the method I used allowed for the integration of context-specific variability, making the findings more adaptable for readers who may contemplate implementing a similar intervention. This adaptability would enable them to customize their feasibility assessments to suit their specific circumstances. The activity-based prospective microcosting approach enhances the reliability and validity of cost estimates, particularly in the absence of prior costing studies (Frick, 2009).

Moreover, the program provider perspective was adopted to ensure that the items included in the cost estimation were directly relevant to those implementing the program.

Additionally, I meticulously carried out essential adjustments, including currency conversion, market inflation adjustments, discounting, and annualization, to further enhance the validity and reliability of our approach and findings.

To further enhance methodological rigor in future studies, there are several considerations. First, implementing daily logs for each individual involved in program implementation could improve the accuracy of estimated time spent by program staff and other participants, albeit at the cost of increased workload. Although this approach is more time-intensive and burdensome, it can reduce bias in estimated time spent by more accurately capturing individual variability. The Kyaterekera study conducted periodic interviews with key program personnel to account for this time burden, particularly for nonstaff individuals like bank officials and site coordinators who were volunteering their time.

Secondly, although this study used a fixed ratio to allocate time and resources between research activities and program implementation due to overlapping study activities, alternative approaches can be explored. This study was conducted as part of a comprehensive longitudinal trial, and although I excluded research-driven activities, certain resources (such as personnel, donated resources, capital items, and program overheads) were shared and unavoidable. I employed an 80/20 ratio based on information provided by program personnel to apportion these shared resources into program implementation and research activities. However, I acknowledge that some costs may have been under- or overestimated using this broad approach. There is currently no standardized method for handling the costs of shared resources, so each study should consider its unique implementation context and justify its allocation method to best reflect actual practice.

It is essential to emphasize that each implementation takes place in its unique context. This study centered on the combined implementation of an HIVRR, and economic empowerment intervention designed specifically for WESW in five districts in Uganda. The distinct socioeconomic landscape of this geographic region and the characteristics of WESW have been extensively detailed elsewhere (Nabunya et al., 2021). As a result, my findings may not readily apply to different geographic areas and program delivery methods. This is precisely why I employed an activity-based prospective microcosting method to link resources to specific activities, allowing readers to adapt the framework and results to their individual implementation settings. Although the per participant cost of the economic empowerment intervention for WESW was found to be slightly higher than that of similar interventions targeting different populations in Uganda, it is essential to recognize the paramount importance of health equity in this context. Without a focus on health equity, marginalized populations, including WESW, risk being left behind, exacerbating disparities, and undermining the goal of eliminating HIV/AIDS. Therefore, my findings should be interpreted with caution and should not deter the prioritization of interventions for WESW in resource-constrained settings simply due to higher implementation costs. In this regard, I hope that this dissertation contributes to addressing the dearth of evidence regarding the economic cost of implementing combination interventions for WESW in resource-constrained settings and underscores the significance of increased investment in this marginalized population to better achieve the goal of health equity in HIV risk prevention strategies.

Cost-Effectiveness of the Intervention

The global focus on expanding interventions for HIV prevention and control among vulnerable populations in resource-limited settings has gained significant momentum. However,

there is a notable lack of well-documented cost information and cost-effectiveness assessments for interventions aimed at reducing HIV incidence among WESW in SSA. A systematic review conducted to assess the cost-effectiveness of HIV and other sexual reproductive health interventions targeting WESW found limited economic evidence of such interventions. There were only 19 studies which had documented the cost-effectiveness of the interventions, of which a handful were conducted in SSA, the majority were in Asia (Rinaldi et al., 2018). Furthermore, understanding the cost-effectiveness of these interventions is critical for informing their replication and widespread adoption by researchers, implementers, and policymakers (Hutubessy et al., 2003; Musuuza et al., 2014). Moreover, several scale-ups of several interventions have been made without cost data (Cleary et al., 2006). Scaling up interventions without cost data can either affect the funder or project beneficiaries in case of over or under budgeting (Cleary et al., 2006). Therefore, researchers need to provide costing information for the interventions implemented. My analysis did not show effectiveness of the intervention on HIV risk behavior.

During my literature review, I did not come across any studies that have examined the effectiveness of economic empowerment interventions on savings among WESW in SSA. Consequently, it is not possible to make direct comparisons with other research findings. However, although the increase in women's savings is a positive outcome, it is essential to acknowledge that it doesn't, on its own, provide insight into whether these results have led to a reduction in the incidence of HIV, STIs, and other risky sexual behaviors that pose significant risks to the lives of WESW. Therefore, there is a pressing need for further research, building upon the findings from the parent study, to assess the effectiveness of the intervention in terms of its impact on the measured sexual risk-taking behaviors among these vulnerable women.

Study Limitations

This dissertation presents several limitations that should be considered when interpreting

its findings. Primarily, the study relied on self-reported data, which is susceptible to various

biases, including social desirability, recall, and response bias. In the context of self-reported data,

respondents may tend to provide answers they perceive as socially acceptable or aligned with

societal norms, potentially resulting in an overestimation of positive behaviors and an

underestimation of negative behaviors. These biases can compromise the accuracy and reliability

of the data. Additionally, participants may encounter challenges in accurately recalling past

events, introducing potential inaccuracies in their responses, especially when inquiring about

historical or infrequent events. Respondents might also be inclined to respond in a manner they

believe will please the researcher, introducing a form of bias that distorts the true situation. This

issue is particularly salient in research on sensitive topics, where individuals may be reluctant to

divulge truthful information due to social or cultural stigmas.

Secondly, the Kyaterekera study involved the collection of biological tests, which

encompassed screening for HIV and STIs. These tests were administered by skilled medical

personnel. Regrettably, as detailed in Chapter 4, the ongoing impact of the COVID-19 pandemic

resulted in the suspension of biological tests at the 6-month and 12-month follow-up

assessments. Consequently, the study had to rely on self-reported HIV results for all the data

points, introducing a potential source of bias that may influence the study's findings.

The third limitation arises from the interruption of data collection and intervention

activities during the COVID-19 outbreak. The study activities were disrupted to mitigate the risk

of COVID-19 virus transmission between the study team and the participants. This disruption to

the study's timeline could potentially have influenced the results. Notably, the study did not

detect an impact of the intervention on women's HIV risk behavior at the 6-month and 12-month follow-up points, which may be attributed to the challenges faced during the COVID-19 pandemic. To address the disruption caused by COVID-19 in the study, I used self-reported data instead of biomarkers, which were not collected during the COVID-19 period. Additionally, I employed multilevel mixed-effects models to handle missing data, as a significant amount of data were missing due to the disruption in data collection caused by COVID-19. These models were estimated using the full information maximum likelihood method, which addresses missing data without the need for replacement or imputation.

Another notable limitation is the number of data points considered for analysis. Kyaterekera study had five data points, including assessments at baseline, 6 months, 12 months, 18 months, and 24 months. However, this study used three data points—baseline, 6 months, and 12 months follow up. By using a subset of the five data points, this study may not have fully captured the longitudinal impact of the intervention on women's savings. Analyses included 18 and 24-month data would have more statistical power, keep other factors constant. Note that that by the time of this study, Kyaterekera study was still conducting the 18 months and 24 months follow up.

Implications for Public Health Programming, Policy, and Research

This study was premised on sociocognitive theory and asset theory. The findings of this study hold significant implications for the development of programs and policies targeting WESW, particularly in resource-constrained settings, such as SSA. The study found no significant effect of the economic empowerment intervention on HIV risk behaviors of WESW. The findings of this study suggest several implications for programming and policy. One significant implication is the need to reassess the components of the intervention, particularly the

MSAs. In the primary study, women were not restricted in the use of their matched savings during and after the intervention period. Restricting the use of matched savings for specific purposes outlined by the program could help ensure that the savings are used as intended, such as investing in income-generating activities. Doing so could ultimately help women reduce their reliance on sex work income, leading to a reduction in HIV risk behavior. The controlled use of matched savings has been successful in implementing interventions with health behavioral outcomes, highlighting its potential effectiveness in this context (Bermudez et al., 2016; Jennings et al., 2016).

Programs and policymakers should also contemplate long-term and sustainable interventions that extend beyond short-term initiatives. This could entail collaborating with training institutions to provide extended skills development and mentorship programs, as well as facilitating connections for WESW to gain employment. Such measures could help sustain the outcomes of interventions over the long term, ensuring lasting positive impacts on the lives of WESW.

Additionally, enhancing women's social support could increase their savings. Enhancing women's social support networks is a critical strategy for increasing their financial stability and savings. Social support can manifest in various forms, including emotional encouragement, practical assistance, and access to valuable information. For HIV-positive women, robust social support networks can help mitigate the isolation and stigma often associated with their condition. Emotional support from family, friends, and community groups can boost their mental health and resilience, enabling them to pursue economic opportunities more effectively.

Practical assistance, such as help with childcare or transportation, can free up time for women to engage in income-generating activities or further their education, directly contributing

to increased savings. Moreover, social networks can provide vital information on financial literacy, savings programs, and available resources. By participating in community groups or support networks, women can share knowledge and experiences, fostering a collective learning environment that empowers them to make informed financial decisions.

Empirical evidence suggests that women with strong social support systems are more likely to participate in savings groups or cooperatives, which offer structured ways to save money and access credit. These groups not only provide financial benefits but also create a sense of solidarity and mutual accountability among members, further reinforcing positive savings behaviors. Therefore, enhancing social support for HIV-positive women is not only beneficial for their psychological well-being but also for their economic empowerment and financial security(Mantsios et al., 2018).

Incorporating financial support into care programs for HIV-positive women could reduce their expenditure, leading to increased savings and potentially reducing HIV risk behaviors. Incorporating financial support into care programs for HIV-positive women holds significant potential for improving their economic outcomes and reducing HIV risk behaviors. Financial support can take various forms, including direct cash transfers, microloans, savings incentives, and FLT. Integrating these elements into healthcare programs can address the multifaceted challenges faced by HIV-positive women. Direct cash transfers provide immediate financial relief, allowing women to meet their basic needs without resorting to high-risk behaviors such as transactional sex. This immediate financial stability can reduce stress and improve adherence to HIV treatment regimens, ultimately enhancing health outcomes. Additionally, microloans and savings incentives can empower women to start small businesses or invest in income-generating activities, fostering long-term economic independence and stability. Integrating financial support

into care programs also aligns with the broader goals of holistic healthcare, which recognizes the

interconnection between financial stability and health outcomes. By addressing economic

insecurities, care programs can create a more supportive environment for HIV-positive women,

ultimately leading to improved health, reduced HIV transmission, and enhanced quality of life.

To establish causal relationships, longitudinal studies can be employed. Notably, the

parent study, the Kyaterekera project, encompasses five waves of data. However, this

dissertation used three waves of data only. Consequently, there exists an opportunity to reinforce

the findings of this study by conducting a comprehensive analysis of all five waves of data,

which can help establish cause-and-effect relationships more robustly.

In addition to assessing the impact of the intervention on HIV risk behavior, this study

also calculated cost of implementing the intervention and its effectiveness. To enhance the

relevance of this research and justify the potential scaling-up of the economic empowerment

intervention among WESW and other vulnerable populations in resource-constrained settings,

like SSA, it is essential to investigate the number of HIV cases averted among this specific

population. Therefore, further research is warranted in this domain to complement the findings of

this study.

In conclusion, although this study did not find a significant effect of the economic

empowerment intervention on HIV risk behaviors among WESW, it provides valuable insights

that can inform the development of more effective programs and policies in resource-constrained

settings. The use of innovative methodologies to address data collection challenges during

disruptions such as the COVID-19 pandemic demonstrates the importance of flexibility and

adaptability in research design. These findings underscore the need for continued research and

tailored interventions to address the complex interplay between economic factors and sexual

health behaviors among vulnerable populations.

References

Abdella, S., Demissie, M., Worku, A., Dheresa, M., & Berhane, Y. (2022). HIV prevalence and associated factors among female sex workers in Ethiopia, east Africa: A cross-sectional study using a respondent-driven sampling technique. *EClinicalMedicine, 51*, Article 101540. https://doi.org/10.1016/j.eclinm.2022.101540

Africa, K., Welte, A., Kassanjee, R., Welte, A., Otwombe, K., Jaffer, M., Milovanovic, M., Hlongwane, K., Puren, A. J., Hill, N., Mbowane, V., Dunkle, K., Gray, G., Abdullah, F., Jewkes, R., & Coetzee, J. (2022). HIV incidence estimation among female sex workers in South Africa: a multiple methods analysis of cross-sectional survey data. *Lancet HIV, 9*, e781–e790. https://doi.org/10.1016/S2352-3018(22)00201-6

Agrawal Sagtani, R., Baral Koirala, D. B., & Kumar Yadav Koirala, D. B. (2015). Understanding socio economic contexts of female sex workers in eastern Nepal. *Nepal Medical College Journal, 16*(2–4), 119–124. https://old.nmcth.edu/images/gallery/Original%20Article/sagtani_RA.pdf

Akullian, A. N., Mukose, A., Levine, G. A., & Babigumira, J. B. (2016). People living with HIV travel farther to access healthcare: a population-based geographic analysis from rural Uganda. *Journal of the International AIDS Society*, *19*(1). https://doi.org/10.7448/IAS.19.1.20171

Bandura, A. (1997). *Self-efficacy: The exercise of control*. Freeman and Company.

Alqassim, A., & El-Setouhy, M. (2022). Impact of poverty on health. In A. E. Onal (Ed.), *Healthcare access—New threats, new approaches*. IntechOpen. https://doi.org/10.5772/intechopen.108704

Amponsah, S., Omoregie, C. O., & Ansah, B. O. (2018). African cultures and the challenges of

    quality education for sustainable development. In M. B. M. Avoseh & V. Colón (Eds.),

    Proceedings of the American Association for Adult and Continuing Education (AAACE)

    Commission for International Adult Education (CIAE) Annual Pre-Conference (pp. 49–

    56). https://files.eric.ed.gov/fulltext/ED597456.pdf

Ando, A., & Modigliani, F. (1963). The "life cycle" hypothesis of saving: Aggregate

    implications and tests. *The American Economic Review, 53*(1), 55–84.

    https://www.jstor.org/stable/1817129

Argento, E., Reza-Paul, S., Lorway, R., Jain, J., Bhagya, M., Fathima, M., Sreeram, S. V.,

    Hafeezur, R. S., & O'Neil, J. (2011). Confronting structural violence in sex work:

    Lessons from a community-led HIV prevention project in Mysore, India. *AIDS Care—*

    Psychological and Socio-Medical Aspects of AIDS/HIV, *23*(1), 69–74.

    https://doi.org/10.1080/09540121.2010.498868

Arinaitwe, B., Ariho, P., Naturinda, C. H., Byoleko, B., Base, A., Atwijukiire, H., Matavu, H.,

    Kabami, J., Obua, C., Wakida, E. K., & Otwine, A. (2023). Enrollment and retention of

    female sex workers in HIV care in health facilities in Mbarara city. *Frontiers in*

    Reproductive Health, *4*. Article 1089663. https://doi.org/10.3389/FRPH.2022.1089663

Aryeetey, E., & Christopher, U. (2000). *Saving in Sub-Saharan Africa* (CID Working Paper No.

    38). https://dash.harvard.edu/handle/1/39477708

Atuhaire, L., Adetokunboh, O., Shumba, C., & Nyasulu, P. S. (2021). Effect of community-based interventions targeting female sex workers along the HIV care cascade in sub-Saharan Africa: A systematic review and meta-analysis. *Systematic Reviews*, *10*(1), 1–20. https://doi.org/10.1186/S13643-021-01688-4

Backhaus, A., & Loichinger, E. (2022). Female labor force participation in sub-Saharan Africa: A cohort analysis. *Population and Development Review*, *48*(2), 379–411. https://doi.org/10.1111/PADR.12492

Balasubramanian, S. A., & Kuppusamy, T. (2021). Does female labour force participation contribute to better financial inclusion? Evidence from cross-country analysis. *Journal of Economic and Administrative Sciences*, *37*(4), 643–658. https://doi.org/10.1108/JEAS-08-2020-0151

Baleta, A. (2015). Lives on the line: Sex work in sub-Saharan Africa. *The Lancet*, *385*(9962), e1–e2. https://doi.org/10.1016/S0140-6736(14)61049-7

Balfour, R., & Allen, J. (2014). *A review of the literature on sex workers and social exclusion*. UCL Institute of Health Equity https://assets.publishing.service.gov.uk/media/5a7eb0b7e5274a2e87db1495/A_Review_of_the_Literature_on_sex_workers_and_social_exclusion.pdf

Bank of Uganda. (2023). *Bank of Uganda: Exchange rates*. https://www.bou.or.ug/bouwebsite/ExchangeRates/

Baral, S., Beyrer, C., Muessig, K., Poteat, T., Wirtz, A. L., Decker, M. R., Sherman, S. G., & Kerrigan, D. (2012). Burden of HIV among female sex workers in low-income and middle-income countries: A systematic review and meta-analysis. *The Lancet Infectious Diseases*, *12*(7), 538–549. https://doi.org/10.1016/S1473-3099(12)70066-X

Benner, B. E. (2022). HIV vulnerability among survival sex workers through sexual violence and drug taking in a qualitative study from Victoria, Canada, with additional implications for pre-exposure prophylaxis for sex workers. *Frontiers in Sociology*, *6*, 208. https://doi.org/10.3389/FSOC.2021.714208/XML/NLM

Bermudez, L. G., Jennings, L., Ssewamala, F. M., Nabunya, P., Mellins, C., & McKay, M. (2016). Equity in adherence to antiretroviral therapy among economically vulnerable adolescents living with HIV in Uganda. *AIDS Care—Psychological and SocioMedical Aspects of AIDS/HIV*, *28*, 83–91. https://doi.org/10.1080/09540121.2016.1176681

Bitty-Anderson, A. M., Gbeasor-Komlanvi, F. A., Kouame Tchankoni, M., Sadio, A., Salou, M., Coffie, P. A., Dagnra, C. A., & Ekouevi, D. K. (2022). *HIV prevalence and risk behaviors among female sex workers in Togo in 2017: A cross-sectional national study*. https://doi.org/10.1186/s13690-022-00851-0

Boroumandfar, Z., Esmaeili, R., & Mohaghegh, N. (2022). The story of female sex workers in the shadow of sex work coercion: A qualitative study. *Iranian Journal of Nursing and Midwifery Research*, *27*(3), 243–249. https://doi.org/10.4103/IJNMR.IJNMR_387_20

Bowen, D. (2013). *The impact of legalizing prostitution on violent crime*. Mercatus Center. https://www.mercatus.org/students/research/essays/impact-legal-prostitution-violent-crime

Buvinic, M., & Jaluka, T. (2018). Mindful savings: *Exploring the power of savings for women*. Center for Global Development. https://www.cgdev.org/sites/default/files/mindful-saving-exploring-power-savings-women.pdf

Carillo, K. D. (2010). Social cognitive theory in is research—Literature review, criticism, and research agenda. *Communications in Computer and Information Science*, *54*, 20–31. https://doi.org/10.1007/978-3-642-12035-0_4

Chanda, M. M., Ortblad, K. F., Mwale, M., Chongo, S., Kanchele, C., Kamungoma, N., Barresi, L. G., Harling, G., Bärnighausen, T., & Oldenburg, C. E. (2017). Contraceptive use and unplanned pregnancy among female sex workers in Zambia. *Contraception*, *96*(3), 196–202. https://doi.org/10.1016/J.CONTRACEPTION.2017.07.003

Chemaitelly, H., Ayoub, H. H., Omori, R., El Feki, S., Hermez, J. G., Weiss, H. A., & Abu-Raddad, L. J. (2022). HIV incidence and impact of interventions among female sex workers and their clients in the Middle East and north Africa: A modelling study. *The Lancet HIV*, *9*(7), e496–e505. https://doi.org/10.1016/S2352-3018(22)00100-X

Cleary, S. M., McIntyre, D., & Boulle, A. M. (2006). The cost-effectiveness of antiretroviral treatment in Khayelitsha, South Africa—A primary data analysis. *Cost Effectiveness and Resource Allocation*, *4*(1), 1–14. https://doi.org/10.1186/1478-7547-4-20

Collins, L. M., Schafer, J. L., & Kam, C. M. (2001). A comparison of inclusive and restrictive strategies in modern missing data procedures. *Psychological Methods*, *6*(3), 330–351. https://doi.org/10.1037/1082-989x.6.4.330

Davey, C., Cowan, F., & Hargreaves, J. (2018). The effect of mobility on HIV-related healthcare access and use for female sex workers: A systematic review. *Social Science and Medicine*, *211*, 261–273. Elsevier Ltd. https://doi.org/10.1016/j.socscimed.2018.06.017

Della Giusta, M., Di Tommaso, M. L., Shima, I., & Stroem, S. (2012). What money buys: Clients of street sex workers in the US. Applied Economics, 41(18), 2261–2277. https://doi.org/10.2139/SSRN.1803429

Dolinsek, S., & Hearne, S. (2022). Introduction: prostitution in twentieth century Europe. *European Review of History*, *29*(2), 121–144. https://doi.org/10.1080/13507486.2022.2029361

Doshi, R. H., Sande, E., Ogwal, M., Kiyingi, H., McIntyre, A., Kusiima, J., Musinguzi, G., Serwadda, D., & Hladik, W. (2018). Progress toward UNAIDS 90-90-90 targets: A respondent-driven survey among female sex workers in Kampala, Uganda. *PLOS ONE*, *13*(9), e0201352. https://doi.org/10.1371/JOURNAL.PONE.0201352

Dunkle, K. L., Beksinska, M. E., Rees, V. H., Ballard, R. C., Htun, Y., & Wilson, M. L. (2005). Risk factors for HIV infection among sex workers in Johannesburg, South Africa. *International Journal of STD and AIDS*, *16*(3), 256–261. https://doi.org/10.1258/0956462053420220

El-Bassel, N., McCrimmon, T., Mergenova, G., Chang, M., Terlikbayeva, A., Primbetova, S., Kuskulov, A., Baiserkin, B., Denebayeva, A., Kurmetova, K., & Witte, S. S. (2021). A cluster-randomized controlled trial of a combination HIV risk reduction and microfinance intervention for female sex workers who use drugs in Kazakhstan. *Journal of the International AIDS Society*, *24*(5), e25682. https://doi.org/10.1002/jia2.25682

Ferrant, G., Pesando, M., & Nowacka, K. (2014). *Unpaid care work: The missing link in the analysis of gender gaps in labour outcomes*. Organisation for Economic Cooperation and Development. https://read.oecd-ilibrary.org/view/?ref=1227_1227993-tc9lf4qiaj&title=Unpaid-Care-Work-The-Missing-Link-in-the-Analysis-of-Gender-Gaps-in-Labour-Outcomes

Freeman, J. (2019). Legalization of sex work in the United States: An HIV reduction strategy current developments 2018–2019. *Georgetown Journal of Legal Ethics*, *32*(4), 597–614. https://www.law.georgetown.edu/legal-ethics-journal/wp-content/uploads/sites/ 24/2019/11/GT-GJLE190033.pdf

Frick, K. D. (2009). Microcosting quantity data collection methods. *Medical Care*, *47*(7 Suppl 1), S76–S81. https://doi.org/10.1097/mlr.0b013e31819bc064

Fry, T. R. L., Mihajilo, S., Russell, R., & Brooks, R. (2008). The factors influencing saving in a matched savings program: Goals, knowledge of payment instruments, and other behavior. *Journal of Family and Economic Issues*, *29*(2), 234–250. https://doi.org/10.1007/s10834-008-9106-y

Gao, N., Schmidt, L. T., Gill, K. J., & Pratt, C. W. (2011). Building human capital to increase earning power among people living with mental illnesses. *Psychiatric Rehabilitation Journal*, *35*(2), 117–124. https://doi.org/10.2975/35.2.2011.117.124

Garibaldi, P. (2006). *Personnel economics in imperfect labour markets*. OUP Oxford.

Gerassi, L. (2015). A heated debate: Theoretical perspectives of sexual exploitation and sex work. *Journal of Sociology and Social Welfare*, *42*(4), 79–100. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4730391/

Gersovitz, M. (1998). Savings and development. In H. Chenery & T. N. Srinivasan (Eds.) . *Handbook of Development Economics* (Vol. I, pp. 382–424). Elsevier Science Publishers B.B.

Gibly, J. N. (2023). Safe sex for sale: Is legalizing sex work the answer to sex trafficking in the Netherlands? *International Journal of Undergraduate Research and Creative Activities Creative Activities*, *4*(1), Article 2. https://doi.org/10.7710/2168-0620.1004

Goldmann, C. (2011). *Current assessment of the state of prostitution.* Scelles Foundation. https://www.fondationscelles.org/pdf/current-assessment-of-the-state-of-prostitution-2013.pdf

Gore, M. N., & Patwardhan, A. R. (2022). Disparities in the cost of living adjusted earnings of female sex workers in India, Thailand, and the USA: A need to create an equitable economic survival of female sex workers. *Journal of Primary Care & Community Health*, *13*. https://doi.org/10.1177/21501319221101857

Grinstein-Weiss, M., Wagner, K., Ssewamala, F. M., & Warren, G. (2005). Saving and asset accumulation among low-income families with children in IDAs (CSD Working Paper No. 05-09). *Children and Youth Services*, *28*(2), 193–211. https://core.ac.uk/download/pdf/233215606.pdf

Grohs, S. (2019). Contested boundaries: The moralization and politicization of prostitution in German cities. *European Urban and Regional Studies, 27*(2), 156–170. https://doi.org/10.1177/0969776418822083

Haakenstad, A., Moses, M. W., Tao, T., Tsakalos, G., Zlavog, B., Kates, J., Wexler, A., Murray, C. J. L., & Dieleman, J. L. (2019). Potential for additional government spending on HIV/AIDS in 137 low-income and middle-income countries: An economic modelling study. *Lancet HIV*, *6*(6), e382–e395. https://doi.org/10.1016/S2352-3018(19)30038-4

Hladik, W., Baughman, A. L., Serwadda, D., Tappero, J. W., Kwezi, R., Nakato, N. D., & Barker, J. (2017). Burden and characteristics of HIV infection among female sex workers in Kampala, Uganda—A respondent-driven sampling survey. *BMC Public Health*, *17*(1), 1–12. https://doi.org/10.1186/S12889-017-4428-Z

Husereau, D., Drummond, M., Augustovski, F., de Bekker-Grob, E., Briggs, A. H., Carswell, C., Caulley, L., Chaiyakunapruk, N., Greenberg, D., Loder, E., Mauskopf, J., Mullins, C. D., Petrou, S., Pwu, R. F., & Staniszewska, S. (2022). Consolidated Health Economic Evaluation Reporting Standards 2022 (CHEERS 2022) statement: updated reporting guidance for health economic evaluations. *BMC Medicine*, *20*(1), Article 23. https://doi.org/10.1186/s12916-021-02204-0

Hutubessy, R., Chisholm, D., Tan-Torres Edejer, T., Adam, T., Baltussen, R., Evans, D., Johns, B., Lauer, J., & Murray, C. (2003). Generalized cost-effectiveness analysis for national-level priority-setting in the health sector. *Cost Effectiveness and Resource Allocation*, *1*(1), 1–13. https://doi.org/10.1186/1478-7547-1-8

Jennings, L., Ssewamala, F. M., & Nabunya, P. (2016). Effect of savings-led economic empowerment on HIV preventive practices among orphaned adolescents in rural Uganda: Results from the Suubi-Maka randomized experiment. *AIDS Care—Psychological and SocioMedical Aspects of AIDS/HIV*, *28*(3), 273–282. https://doi.org/10.1080/09540121.2015.1109585

Jennings Mayo-Wilson, L., Yen, B. J., Nabunya, P., Bahar, O. S., Wright, B. N., Kiyingi, J., Filippone, P. L., Mwebembezi, A., Kagaayi, J., Tozan, Y., Nabayinda, J., Witte, S. S., & Ssewamala, F. M. (2022). Economic abuse and care-seeking practices for HIV and financial support services in women employed by sex work: A cross-sectional baseline assessment of a clinical trial cohort in Uganda. *Journal of Interpersonal Violence*, *38*(1–2), 1920–1949. https://doi.org/10.1177/08862605221093680

Johansson, I., & Hansen, M. A. (2023). What sex workers do: Associations between the exchange of sexual services for payment and sexual activities. *Sexuality & Culture, 28*, 825–850. https://doi.org/10.1007/s12119-023-10148-1

Kalanda, B. (2010). Empowering young sex workers for safer sex in Dowa and Lilongwe Districts of Malawi. *The Journal of Medical Association of Malawi*, *22*(1), 10–11. https://doi.org/10.4314/mmj.v22i1.55900

Karlan, D., Ratan, A. L., & Zinman, J. (2014). Savings by and for the poor: A research review and agenda. *Review of Income and Wealth*, *60*(1), 36–78. https://doi.org/10.1111/ROIW.12101

Karlsson, H. (2022). Sex work policy worldwide: A scoping review. *Sexuality and Culture*, *26*(6), 2288–2310. https://doi.org/10.1007/S12119-022-09983-5

Kate Grabowski, M., Lessler, J., Bazaale, J., Nabukalu, D., Nankinga, J., Nantume, B., Ssekasanvu, J., Reynolds, S. J., Ssekubugu, R., Nalugoda, F., Kigozi, G., Kagaayi, J., Santelli, J. S., Kennedy, C., Wawer, M. J., Serwadda, D., Chang, L. W., & Gray, R. H. (2020). Migration, hotspots, and dispersal of HIV infection in Rakai, Uganda. *Nature Communications*, *11*(1), Article 976. https://doi.org/10.1038/s41467-020-14636-y

Kempadoo, K. (2004). *Sexing the Caribbean : Gender, race, and sexual labor*. Routledge. https://www.routledge.com/Sexing-the-Caribbean-Gender-Race-and-Sexual-Labor/Kempadoo/p/book/9780415935043

Kerrigan, D., Mbwambo, J., Likindikoki, S., Davis, W., Mantsios, A., Beckham, S. W., Leddy, A., Shembilu, C., Mwampashi, A., Aboud, S., & Galai, N. (2019). Project Shikamana: community empowerment-based combination HIV prevention significantly impacts HIV incidence and care continuum outcomes among female sex workers in Iringa, Tanzania. *Journal of Acquired Immune Deficiency Syndromes*, *82*(2), 141–148. https://doi.org/10.1097/QAI.0000000000002123

Khan, M. S., Johansson, E., Zaman, S., Unemo, M., Rahat, N. I., & Lundborg, C. S. (2010). Poverty of opportunity forcing women into prostitution-a qualitative study in Pakistan. *Health Care for Women International*, *31*(4), 365–383. https://doi.org/10.1080/07399330903349707

Laga, I., Niu, X., Rucinski, K., Baral, S., Rao, A., Chen, D., Viswasam, N., Phaswana-Mafuya, N. R., Diouf, D., Sabin, K., Zhao, J., Eaton, J. W., & Bao, L. (2023). Mapping the number of female sex workers in countries across sub-Saharan Africa. *Proceedings of the National Academy of Sciences of the United States of America*, *120*(2), e2200633120. https://doi.org/10.1073/pnas.2200633120

Lancaster, K. E., Cernigliaro, D., Zulliger, R., & Fleming, P. F. (2016). HIV care and treatment experiences among female sex workers living with HIV in sub-Saharan Africa: A systematic review. *African Journal of AIDS Research*, *15*(4), 377–386. https://doi.org/10.2989/16085906.2016.1255652

Levinson, D. (1989). *Family violence in a cross cultural perspective.* SAGE Publishers. https://doi.org/10.1002/JTS.2490040317

Liu, S. H., Srikrishnan, A. K., Zelaya, C. E., Solomon, S., Celentano, D. D., & Sherman, S. G. (2011). Measuring perceived stigma in female sex workers in Chennai, India. *AIDS*

Care—Psychological and Socio-Medical Aspects of AIDS/HIV, *23*(5), 619–627.

https://doi.org/10.1080/09540121.2010.525606

Loaba, S. (2022). The impact of mobile banking services on saving behavior in West Africa.

Global Finance Journal, *53*, Article 100620. https://doi.org/10.1016/j.gfj.2021.100620

Lorenzetti, L., Swann, M., Martinez, A., O'Regan, A., Taylor, J., & Hoyt, A. (2021). Using

financial diaries to understand the economic lives of HIV-positive pregnant women and

new mothers in PMTCT in Zomba, Malawi. *PLoS ONE*, *16*(7), e0252083.

https://doi.org/10.1371/journal.pone.0252083

Lowe, M., Joof, M., & Rojas, B. M. (2019). Social and cultural factors perpetuating early

marriage in rural Gambia: An exploratory mixed methods study. *F1000Research*, *8*,

Article 1949. https://doi.org/10.12688/F1000RESEARCH.21076.3

Luchters, S., Chersich, M. F., Rinyiru, A., Barasa, M. S., King'ola, N., Mandaliya, K., Bosire,

W., Wambugu, S., Mwarogo, P., & Temmerman, M. (2008). Impact of five years of peer-

mediated interventions on sexual behavior and sexually transmitted infections among

female sex workers in Mombasa, Kenya. *BMC Public Health*, *8*(1), 1–10.

https://doi.org/10.1186/1471-2458-8-143

Lusardi, A., & Mitchell, O. S. (2014). The economic importance of financial literacy: Theory

and evidence. *Journal of Economic Literature*, *52*(1), 5–44.

https://doi.org/10.1257/JEL.52.1.5

Mahdizadeh, S. M., Sany, S. B. T., Sarpooshi, D. R., Jafari, A., & Mahdizadeh, M. (2021).

Predictors of preventive behavior of nosocomial infections in nursing staff: a structural

equation model based on the social cognitive theory. *BMC Health Services Research*,

21(1), 1–8. https://doi.org/10.1186/S12913-021-07205-6

Mantsios, A., Shembilu, C., Mbwambo, J., Likindikoki, S., Sherman, S., Kennedy, C., &
Kerrigan, D. (2018). 'That's how we help each other": Community savings groups,
economic empowerment and HIV risk among female sex workers in Iringa, Tanzania.
PLOS ONE, *13*(7), e0199583. https://doi.org/10.1371/JOURNAL.PONE.0199583

Marshall, B. D. L., Kerr, T., Shoveller, J. A., Montaner, J. S. G., & Wood, E. (2009). Structural
factors associated with an increased risk of HIV and sexually transmitted infection
transmission among street-involved youth. *BMC Public Health*, *9*, Article 7.
https://doi.org/10.1186/1471-2458-9-7

May, T., Harocopos, A., & Hough, J. M. (2000). *For love or money: Pimps and the management
of sex work* (NCJ No. 190173). Great Britain Home Office, Policing and Reducing Crime
Unit, Research, Development and Statistics Directorate. https://ojp.gov/ncjrs/virtual-
library/abstracts/love-or-money-pimps-and-management-sex-work

McCarthy, B., Benoit, C., Jansson, M., & Kolar, K. (2012). Regulating sex work: Heterogeneity
in legal strategies. *Annual Review of Law and Social Science, 8*, 255–271.
https://doi.org/10.1146/annurev-lawsocsci-102811-173915

McGowan, M., Roche, S. D., Nakitende, A., Wachinger, J., Nanyiri, E., Amongin, J., Nakabuye,
A., Musoke, D. K., McMahon, S. A., Bärnighausen, T., & Ortblad, K. F. (2022).
Understanding how social support influences peer-delivered HIV prevention
interventions among Ugandan female sex workers: A case study from HIV self-testing.
BMC Public Health, *22*(1), Article 427. https://doi.org/10.1186/S12889-022-12836-
3/TABLES/2

McHugh, M. L. (2012). Interrater reliability: the kappa statistic. *Biochemia Medica*, *22*(3), 276–
282. https://doi.org/10.11613/BM.2012.031

Mergenova, G., El-Bassel, N., McCrimmon, T., Terlikbayeva, A., Primbetova, S., Riedel, M., Kuskulov, A., Velez-Grau, C., & Witte, S. S. (2019). Project Nova: A combination HIV prevention and microfinance intervention for women who engage in sex work and use drugs in Kazakhstan. *AIDS and Behavior*, *23*(1), 1–14. https://doi.org/10.1007/s10461-018-2268-1

Mgbako, C. A. (2019). Sex work/prostitution in Africa. In T. Spear (Ed.), *Oxford Research Encyclopedia of African History*. https://doi.org/10.1093/ACREFORE/9780190277734.013.562

Athay, M. M., Kelley, S. D., & Dew-Reeves, S. E. (2012). Brief Multidimensional Students' Life Satisfaction Scale—PTPB Version (BMSLSS-PTPB): Psychometric properties and relationship with mental health symptom severity over time. *Administration and Policy in Mental Health*, *39*(1–2), 30–40. https://doi.org/10.1007/S10488-011-0385-5

Morin, L., Béhanzin, L., Guédou, F. A., Kêkê, R. K., Bushman, L., Anderson, P. L., Gangbo, F., Diabaté, S., Nagot, N., & Alary, M. (2021). HIV prevention and treatment cascades among female sex workers in Benin, West Africa. *Sexually Transmitted Diseases*, *48*(9), 654–662. https://doi.org/10.1097/OLQ.0000000000001399

Mulholland, G. E., Markiewicz, M., Arimi, P., Ssengooba, F., Weir, S., & Edwards, J. K. (2021). HIV prevalence and the HIV treatment cascade among female sex workers in cross-border areas in East Africa. *AIDS and Behavior*, *26*, 556–568. https://doi.org/10.1007/s10461-021-03411-9

Murphy, L. S. (2010). Understanding the social and economic contexts surrounding women Engaged in street-level prostitution. *Issues in Mental Health Nursing*, *31*(12), 775–784. https://doi.org/10.3109/01612840.2010.524345

Musto, J., Jackson, C. A., & Shih, E. (2015). Prostitution and sex work. In J. D. Wright (Ed.), *International encyclopedia of the social & behavioral sciences* (2nd ed.; pp. 279–285). https://doi.org/10.1016/B978-0-08-097086-8.86125-5

Musuuza, J. S., Singer, M. E., Mandalakas, A. M., & Katamba, A. (2014). Key actors' perspectives on cost-effectiveness analysis in Uganda: A cross-sectional survey. *BMC Health Services Research*, *14*(1), Article 539. https://doi.org/10.1186/S12913-014-0539-8

Nabunya, P., Kiyingi, J., Witte, S. S., Sensoy Bahar, O., Jennings Mayo-Wilson, L., Tozan, Y., Nabayinda, J., Mwebembezi, A., Tumwesige, W., Mukasa, B., Namirembe, R., Kagaayi, J., Nakigudde, J., McKay, M. M., & Ssewamala, F. M. (2021). Working with economically vulnerable women engaged in sex work: Collaborating with community stakeholders in southern Uganda. *Global Public Health*, *7*, 1215–1231. https://doi.org/10.1080/17441692.2021.1916054

Namey, E., Perry, B., Headley, J., Yao, A. K., Ouattara, M. L., Shighata, C., & Ferguson, M. (2018). Understanding the financial lives of female sex workers in Abidjan, Côte d'Ivoire: Implications for economic strengthening interventions for HIV prevention. *AIDS Care—Psychological and Socio-Medical Aspects of AIDS/HIV*, *30*, 6–17. https://doi.org/10.1080/09540121.2018.1479031

Nanda, G. (2011). *Compendium of gender scales*. https://www.indikit.net/document/86-compendium-of-gender-scales

Ngubane, S. J. (2010). *Gender roles in the African culture: Implications for the spread of HIV/AIDS* [Master's thesis, Stellenbosch University]. https://core.ac.uk/download/pdf/37323864.pdf

Ngugi, E. N., Roth, E., Mastin, T., Nderitu, M. G., & Yasmin, S. (2012a). Female sex workers in Africa: Epidemiology overview, data gaps, ways forward. *Journal of Social Aspects of HIV/AIDS Research Alliance / SAHARA , Human Sciences Research Council*, *9*(3), 148–153. https://doi.org/10.1080/17290376.2012.743825

Noponen, H. (1992). Loans to the working poor: A longitudinal study of credit, gender and the household economy. *International Journal of Urban and Regional Research, 16(2),* 234–251. https://sci-hub.se/10.1111/j.1468-2427.1992.tb00171.x

Nyato, D., Nnko, S., Komba, A., Kuringe, E., Plotkin, M., Mbita, G., Shao, A., Changalucha, J., & Wambura, M. (2019). Facilitators and barriers to linkage to HIV care and treatment among female sex workers in a community-based HIV prevention intervention in Tanzania: A qualitative study. *PLOS ONE*, *14*(11), e0219032. https://doi.org/10.1371/JOURNAL.PONE.0219032

Odek, W. O., Busza, J., Morris, C. N., Cleland, J., Ngugi, E. N., & Ferguson, A. G. (2009). Effects of micro-enterprise services on HIV risk behaviour among female sex workers in Kenya's urban slums. *AIDS and Behavior*, *13*(3), 449–461. https://doi.org/10.1007/s10461-008-9485-y

Odon, Q. T., Male, C., Onagoruwa, A. O., & Yedan, A. (2017). *Key findings ahead of the October 2017 high level meeting on ending child marriage in West and Central Africa (French)* [Report Number 120586]. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/863211508525080429/key-findings-ahead-of-the-october-2017-high-level-meeting-on-ending-child-marriage-in-west-and-central-africa

Organisation for Economic Cooperation and Development. (2023). *Household savings (indicator).* https://doi.org/10.1787/cfc6f499-en

Ojide, K. C., Ojide, M. G., & Ogbodo, J. (2021). Rural household income: Who's educational attainment counts? *Regional Economic Development Research*, *2*(1), 25–37. https://doi.org/10.37256/redr.212021599

Yacob-Haliso, O., & Falola, T. (2021). Introduction: Decolonizing African women's studies. In O. Yacob-Haliso & T. Falola (Eds.), *The Palgrave handbook of African women's studies* (pp. 3–43). Springer International Publishing. https://doi.org/10.1007/978-3-030-28099-4

Olarewaju, T., & Olarewaju, T. (2020). *Ethnic poverty: Causes, implications, and solutions*. In W. Leal Filho, A. M. Azul, L. Brandli, A. Lange Salvia, P. G. Özuyar, & T.Wall (Eds.), *No Poverty. Encyclopedia of the UN Sustainable Development Goals*. Springer, Cham. https://doi.org/10.1007/978-3-319-69625-6_124-1

Olawore, O., Astatke, H., Lillie, T., Persaud, N., Lyons, C., Kamali, D., Wilcher, R., & Baral, S. (2020). Peer recruitment strategies for female sex workers not engaged in HIV prevention and treatment services in Côte d'Ivoire: Program data analysis. *JMIR Public Health Surveill, 6*(4), e18000. https://doi.org/10.2196/18000

Onyeneho, N. G. (2009). HIV/AIDS risk factors and economic empowerment needs of female sex workers in Enugu Urban, Nigeria. *Tanzania Journal of Health Research*, *11*(3), 126–135. https://doi.org/10.4314/thrb.v11i3.47698

Orchard, T. (2020). Sex work and prostitution. In A. Lykins (Eds.), *Encyclopedia of sexuality and gender* (pp. 1–5). Springer International Publishing. https://doi.org/10.1007/978-3-319-59531-3_15-1

Oyibo, K., Adaji, I., & Vassileva, J. (2018). Social cognitive determinants of exercise behavior in the context of behavior modeling: A mixed method approach. *Digital Health*, *4*. https://doi.org/10.1177/2055207618811555

Page-Adams, D. (1995). *Economic resources and marital violence* [Unpublished doctoral dissertation] Washington University in St. Louis].

Panzer, A. D., Emerson, J. G., D'Cruz, B., Patel, A., Dabak, S., Isaranuwatchai, W., Teerawattananon, Y., Ollendorf, D. A., Neumann, P. J., & Kim, D. D. (2020). Growth and capacity for cost-effectiveness analysis in Africa. *Health Economics*, *29*(8), 945–954. https://doi.org/10.1002/HEC.4029

Pazarbasioglu, C., Mora, A. G., Uttamchandani, M., Natarajan, H., Feyen, E., & Saal, M. (2020). *Digital financial services*. World Bank Group. https://pubdocs.worldbank.org/en/230281588169110691/Digital-Financial-Services.pdf

Platteau, T., de Baetselier, I., van Mieghem, H., Tsoumanis, A., Keersmaekers, K., Ooms, L., Cuylaerts, V., & Florence, E. (2022). Sexually transmitted infections and associated risk factors among male clients of sex workers: A cross-sectional pilot project in Antwerp, Belgium. *Frontiers in Reproductive Health*, *4*, Article 837102. https://doi.org/10.3389/FRPH.2022.837102

Qin, Y. (2023). The relationship between educational attainment, unemployment rate, and income disparity in the United States. *Journal of Education, Humanities and Social Science*s, *19*, 16–44. https://doi.org/10.54097/ehss.v19i.10958

Ramsey, S. D., Willke, R. J., Glick, H., Reed, S. D., Augustovski, F., Jonsson, B., Briggs, A., & Sullivan, S. D. (2015). Cost-effectiveness analysis alongside clinical trials II-An ISPOR

Good Research Practices Task Force report. *Value in Health*, *18*(2), 161–172. https://doi.org/10.1016/J.JVAL.2015.02.001

Redfern, A., Cluver, L. D., Casale, M., & Steinert, J. I. (2019). Cost and cost-effectiveness of a parenting programme to prevent violence against adolescents in South Africa. *BMJ Global Health*, *4*(3), e001147. https://doi.org/10.1136/bmjgh-2018-001147

Rinaldi, G., Kiadaliri, A. A., & Haghparast-Bidgoli, H. (2018). Cost effectiveness of HIV and sexual reproductive health interventions targeting sex workers: A systematic review. *Cost Effectiveness and Resource Allocation*, *16*(1), Article 63. https://doi.org/10.1186/S12962-018-0165-0

Ritchwood, T. D., Bishu, K. G., & Egede, L. E. (2017). Trends in healthcare expenditure among people living with HIV/AIDS in the United States: Evidence from 10 Years of nationally representative data. *International Journal for Equity in Health*, *16*(1), Article 188. https://doi.org/10.1186/s12939-017-0683-y

Rohe, W. M., & Stegman, M. A. (1994). The effects of home ownership on the self-esteem, perceived control and life satisfaction of low-income people. *Journal of the American Planning Association*, *60*, 173–184. https://doi.org/10.1080/01944369408975571

Sanders, G. D., Neumann, P. J., Basu, A., Brock, D. W., Feeny, D., Krahn, M., Kuntz, K. M., Meltzer, D. O., Owens, D. K., Prosser, L. A., Salomon, J. A., Sculpher, M. J., Trikalinos, T. A., Russell, L. B., Siegel, J. E., & Ganiats, T. G. (2016). Recommendations for conduct, methodological practices, and reporting of cost-effectiveness analyses: Second panel on cost-effectiveness in health and medicine. *Journal of the American Medical Association*, *316*(10), 1093–1103. https://doi.org/10.1001/jama.2016.12195

Schuler, S. R., & Hashemi, S. M. (1994). Credit programs, women's empowerment, and

    contraceptive use in rural Bangladesh. *Studies in Family Planning*, *25*(2), 65–76.

    https://doi.org/10.2307/2138085.

Scorgie, F., Chersich, M. F., Ntaganira, I., Gerbase, A., Lule, F., & Lo, Y. R. (2012). Socio-

    demographic characteristics and behavioral risk factors of female sex workers in sub-

    Saharan Africa: A systematic review. *AIDS and Behavior*, *16*(4), 920–933.

    https://doi.org/10.1007/s10461-011-9985-z

Sebastian, A. T., Rajkumar, E., Tejaswini, P., Lakshmi, R., & Romate, J. (2021). Applying social

    cognitive theory to predict physical activity and dietary behavior among patients with

    type-2 diabetes. *Health Psychology Research*, *9*(1). https://doi.org/10.52965/001C.24510

Shahid, Q., Mian Muhammad Ahmed, I., Ali, A., Aamir, H., Irfan Mehmood, J., & Shazia, T.

    (2013). Causes and decision of women's involvement into prostitution and its

    consequences in Punjab, Pakistan. *Academic Research International*, *4*(5), 398–411.

    http://www.savap.org.pk/journals/ARInt./Vol.4(5)/2013(4.5-40).pdf

Shannon, K., Strathdee, S. A., Goldenberg, S. M., Duff, P., Mwangi, P., Rusakova, M., Reza-

    Paul, S., Lau, J., Deering, K., Pickles, M. R., & Boily, M. C. (2015). Global

    epidemiology of HIV among female sex workers: Influence of structural determinants.

    Lancet, *385*(9962), 55–71. https://doi.org/10.1016/S0140-6736(14)60931-4

Sherraden, M. (1991). *Assets and the poor: A new American welfare policy*. M.E. Sharpe.

    https://books.google.com/books/about/Assets_and_the_Poor.html?id=Icjac1GYUZ0C

Sherraden, M., Schreiner, M., & Beverly, S. (2003). Income, institutions, and saving

    performance in individual development accounts. *Economic Development Quarterly*,

    17(1), 95–112. https://doi.org/10.1177/0891242402239200

Sikhosana, N., & Mokgatle, M. M. (2021). A qualitative exploration on accounts of condom-use negotiation with clients: Challenges and predicaments related to sex work among street-based female sex workers in Ekurhuleni District, South Africa. *Pan African Medical Journal*, *40*, Article 54. https://purerims.smu.ac.za/en/publications/a-qualitative-exploration-on-accounts-of-condom-use-negotiation-w

Sim, A., Puffer, E., Green, E., Chase, R., Zayzay, J., Garcia-Rolland, E., & Boone, L.(2014). *Parents make the difference: Findings from a randomized impact evaluation of a parenting program in rural Liberia.* International Rescue Committee. https://www.rescue.org/sites/default/files/document/704/parentsmakedifferencereportfinal18nov14.pdf

Simić, M., & Rhodes, T. (2009). Violence, dignity and HIV vulnerability: Street sex work in Serbia. *Sociology of Health and Illness*, *31*(1), 1–16. https://doi.org/10.1111/j.1467-9566.2008.01112.x

Soman, D., & Zhao, M. (2011). The fewer the better: Number of goals and savings behavior. *Journal of Marketing Research*, *48*(6), 944–957. https://doi.org/10.1509/jmr.10.0250

Ssewamala, F. (2024, July 17). *Kyaterekera Project: A Combination Intervention Addressing Sexual Risk-Taking Behaviors Among Vulnerable Women in Uganda* (ClinicalTrials.gov ID: NCT03583541). https://clinicaltrials.gov/study/NCT03583541

Ssewamala, F. M., Gauer Bermudez, L., Neilands, T. B., Mellins, C. A., Mckay, M. M., Garfinkel, I., Sensoy Bahar, O., Nakigozi, G., Mukasa, M., Stark, L., Damulira, C., Nattabi, J., & Kivumbi, A. (2018). Suubi4Her: A study protocol to examine the impact and cost associated with a combination intervention to prevent HIV risk behavior and improve mental health functioning among adolescent girls in Uganda. *BMC Public Health*, *18,* Article 693. https://doi.org/10.1186/s12889-018-5604-5

Ssewamala, F. M., McKay, M. M., Sensoy Bahar, O., Nabunya, P., Neilands, T., Kiyingi, J., Namatovu, P., Guo, S., Nakasujja, N., & Mwebembezi, A. (2022). Suubi4StrongerFamilies: A study protocol for a clustered randomized clinical trial addressing child behavioral health by strengthening financial stability and parenting among families in Uganda. *Frontiers in Psychiatry*, *13*, Article 949156. https://doi.org/10.3389/fpsyt.2022.949156

Ssewamala, F. M., Sensoy Bahar, O., Tozan, Y., Nabunya, P., Mayo-Wilson, L. J., Kiyingi, J., Kagaayi, J., Bellamy, S., McKay, M. M., & Witte, S. S. (2019). A combination intervention addressing sexual risk-taking behaviors among vulnerable women in Uganda: Study protocol for a cluster randomized clinical trial. *BMC Women's Health*, *19*(1), Article 693. https://doi.org/10.1186/s12905-019-0807-1

Tan, E. (2014). Human capital theory: A holistic criticism. *Review of Education Research, 84*(3), 411–445. https://doi.org/10.3102/0034654314532696

Tan-Toress, E., Baltussen, R., Adam, T., Hutubessy, A. R., Acharya, A., Evans, D. B, & Murraay C. J. L. (Eds.). (2003). *Making choices in health: WHO guide to cost-effectiveness analysis.* World Health Organization. https://iris.who.int/handle/10665/42699

Tao, Y., Xiao, X., Ma, J., & Wang, H. (2022). The relationship between HIV-related stigma and

    HIV self-management among men who have sex with men: The chain mediating role of

    social support and self-efficacy. *Frontiers in Psychology*, *13*, 1094575.

    https://doi.org/10.3389/fpsyg.2022.1094575

Tarantino, N., Lowery, A., & Brown, L. K. (2020). Adherence to HIV care and associated health

    functioning among youth living with HIV in sub-Saharan Africa. *AIDS Reviews*, *22*(1),

    93–102. https://doi.org/10.24875/AIDSRev.20000101

Tozan, Y., Capasso, A., Namatovu, P., Kiyingi, J., Damulira, C., Nabayinda, J., Bahar, O. S.,

    McKay, M. M., Hoagwood, K., & Ssewamala, F. M. (2022). Costing of a multiple family

    group strengthening intervention (SMART Africa) to improve child and adolescent

    behavioral health in Uganda. *American Journal of Tropical Medicine and Hygiene*,

    106(4), 1078–1085. https://doi.org/10.4269/ajtmh.21-0895

Tozan, Y., Capasso, A., Sun, S., Neilands, T. B., Damulira, C., Namuwonge, F., Nakigozi, G.,

    Mwebembezi, A., Mukasa, B., Sensoy Bahar, O., Nabunya, P., Mellins, C. A., Mckay,

    M. M., & Ssewamala, F. M. (2021). The efficacy and cost-effectiveness of a family-

    based economic empowerment intervention (Suubi + Adherence) on suppression of HIV

    viral loads among adolescents living with HIV: Results from a Cluster Randomized

    Controlled Trial in southern Uganda. *Journal of the International AIDS Society, 24*(6),

    e25752. https://doi.org/10.1002/jia2.25752

Tozan, Y., Sun, S., Capasso, A., Wang, J. S. H., Neilands, T. B., Bahar, O. S., Damulira, C., & Ssewamala, F. M. (2019). Evaluation of a savings-led family-based economic empowerment intervention for AIDS-affected adolescents in Uganda: A four-year follow-up on efficacy and cost-effectiveness. *PLoS ONE*, *14*(12), e0226809. https://doi.org/10.1371/JOURNAL.PONE.0226809

Twizelimana, D., & Muula, A. S. (2021). Unmet contraceptive needs among female sex workers (FSWs) in semi urban Blantyre, Malawi. *Reproductive Health*, *18*(1), Article 11. https://doi.org/10.1186/S12978-020-01064-W

Uganda Bureau of Statistics. (2021a). *Uganda consumer price index: 2009/10*. https://www.ubos.org/wp-content/uploads/publications/ 01_2021CPI_Publication_January_2021.pdf

Uganda Bureau of Statistics. (2021b). *Uganda national household survey 2019/2020*. https://www.ubos.org/wp-content/uploads/publications/09_2021Uganda-National-Survey-Report-2019-2020.pdf

Inter-Agency Task Force on Rural Women. (2012). *Rural women and the Millennium Development Goals* [Fact sheet]. https://www.un.org/womenwatch/feature/ ruralwomen/documents/En-Rural-Women-MDGs-web.pdf

Azcona, G., & Bhatt, A. (2022, Feburary 1). *Poverty deepens for women and girls, according to latest projections*. UN Women Data Hub. https://data.unwomen.org/features/poverty-deepens-women-and-girls-according-latest-projections

UNAIDS. (2019). *Women and HIV—A spotlight on adolescent girls and young women*. https://www.unaids.org/sites/default/files/media_asset/2019_women-and-hiv_en.pdf

UNAIDS. (2021a). *HIV and sex work human rights* [Fact sheet]. https://www.unaids.org/

    en/resources/documents/2021/05-hiv-human-rights-factsheet-sex-work

UNAIDS. (2021b). *UNAIDS data 2021*.

    https://www.unaids.org/en/resources/documents/2021/2021_unaids_data

UNFPA. (2021). *The impact of COVID-19 on sex worker programmes a rapid scoping*

    assessment of in east and southern AFRICA UNFPA East and southern Africa.

    https://esaro.unfpa.org/sites/default/files/pub-pdf/

    condom_programme_strategy_summary-ia.pdf

United Nations Department of Economic and Social Affairs. (2011). *Men in families and family*

    policy in a changing world. https://www.un.org/en/development/desa/ publications/men-

    in-families-and-family-policy-in-a-changing-world.html

Social problems: Continuity and change. (2016). University of Minnesota Libraries Publishing.

    https://doi.org/10.24926/8668.2301

Ministry of Health Uganda. (2022). *Uganda population-based HIV impact assessment 2020–*

    2021 [Summary sheet]. https://phia.icap.columbia.edu/uganda-phia-final-report/

Van der Meulen Rodgers, Y., & Kassens, A. L. (2018). Women's asset ownership and children's

    nutritional status: Evidence from Papua New Guinea. *Social Science & Medicine*, *204*,

    100–107. https://doi.org/10.1016/J.SOCSCIMED.2018.03.026

Walker, D., & Kumaranayake, L. (2002). Allowing for differential timing in cost analyses:

    discounting and annualization. *Health Policy and Planning*, *17*(1), 112–118.

    https://doi.org/10.1093/HEAPOL/17.1.112

Wang, C., Hawes, S. E., Gaye, A., Sow, P. S., Ndoye, I., Manhart, L. E., Wald, A., Critchlow, C.

    W., & Kiviat, N. B. (2007). HIV prevalence, previous HIV testing, and condom use with

clients and regular partners among Senegalese commercial sex workers. *Sexually*

Transmitted Infections, *83*(7), 534–540. https://doi.org/10.1136/sti.2007.027151

Wang, J. S. H., Ssewamala, F. M., Neilands, T. B., Bermudez, L. G., Garfinkel, I., Waldfogel, J.,

Brooks-Gunn, J., & You, J. (2018). Effects of financial incentives on saving outcomes

and material well-being: evidence from a randomized controlled trial in Uganda. *Journal*

of Policy Analysis and Management, *37*(3), 602–629. https://doi.org/10.1002/PAM.22065

West, S. G. (2001). New approaches to missing data in psychological research: Introduction to

the special section. *Psychological Methods*, *6*(3), 315–316. https://doi.org/10.1037/1082-

989x.6.4.315

Witte, S. S., Filippone, P., Ssewamala, F. M., Nabunya, P., Bahar, O. S., Mayo-Wilson, L. J.,

Namuwonge, F., Damulira, C., Tozan, Y., Kiyingi, J., Nabayinda, J., Mwebembezi, A.,

Kagaayi, J., & McKay, M. (2022). PrEP acceptability and initiation among women

engaged in sex work in Uganda: Implications for HIV prevention. *EClinicalMedicine*, *44*,

Article 101278. https://doi.org/10.1016/J.ECLINM.2022.101278

World Bank. (2020). *Poverty and shared prosperity 2020: Reversals of fortune*.

https://www.worldbank.org/en/publication/poverty-and-shared-prosperity-2020

World Bank. [ca. 2024a]. *GNI per capita, Atlas method (current US$)—Uganda.*

https://data.worldbank.org/indicator/NY.GNP.PCAP.CD?locations=UG

World Bank. (2024b, June 18). *World development indicators: Exchange rates and prices*.

https://wdi.worldbank.org/table/4.16

World Economic Forum. (2021). *Global gender gap report*.

https://www.weforum.org/publications/global-gender-gap-report-2021/

Van Wyk, B. E., & Davids, L.-A. C. (2019). Challenges to HIV treatment adherence amongst adolescents in a low socio-economic setting in Cape Town. *Southern African Journal of HIV Medicine*, *22*(1), a1002. https://doi.org/10.4102/sajhivmed.v20i1.1002

Yadama, G. N., & Sherraden, M. (1996). *Effect of assets on attitudes and behaviors: Advance test of a social policy proposal* (Working Paper No. 95-2). Center for Social Development. https://openscholarship.wustl.edu/cgi/viewcontent.cgi?article=1009&context=csd_research

Yang, L. S., Witte, S. S., Vélez-Grau, C., McCrimmon, T., Terlikbayeva, A., Primbetova, S., Mergenova, G., & El-Bassel, N. (2021). The financial lives and capabilities of women engaged in sex work: Can paradoxical autonomy inform intervention strategies? *Global Journal of Health Science*, *13*(6), 69–80. https://doi.org/10.5539/GJHS.V13N6P69

Yaya, S., Shibre, G., Idriss-Wheeler, D., & Uthman, O. A. (2020). Women's empowerment and HIV testing uptake: A meta-analysis of demographic and health surveys from 33 sub-Saharan African countries. *International Journal of Maternal and Child Health and AIDS*, *9*(3), 274–286. https://doi.org/10.21106/IJMA.372

Zamurrad Janjua, P., & Ahmed Kamal, U. (2011). The role of education and income in poverty alleviation: A cross-country analysis. *Lahore Journal of Economics*, *16*(1), 143–172. https://doi.org/10.35536/lje.2011.v16.i1.a6

Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The Multidimensional Scale of Perceived Social Support. *Journal of Personality Assessment*, *52*(1), 30–41. https://doi.org/10.1207/s15327752jpa5201_2

Appendix A: Sample Characteristics of the Sample Considered At Baseline (three groups)

Variable	Full Sample	Control	Treatment 1	Treatment 2
Number of participants	542	186	213	143
Percentage of total sample	100%	34.32%	39.30%	26.38%
Age (18–55 years)	31.37(±7.18)	31.24(±6.77)	31.91(7.77)	30.74(6.75)
Marital status				
Married	139(25.65%)	53(28.49%)	61(28.64%)	25(17.48%)
Separated	331(61.07%)	109(58.60%)	123(57.75%)	99(69.23%)
Single	72(13.28%)	24(12.90%)	29(13.62%)	19(13.29%)
Education level attained				
Primary	344(63.47%)	125(67.20%)	126(59.15%)	93(65.03%)
Postprimary	198(36.53%)	61(32.80%)	87(40.85%)	50(34.97%)
HIV				
Positive	191(35.70%)	73(39.25%)	80(38.83%)	38(26.57%)
Negative	344(64.30%)	113(60.75%)	126(61.17%)	105(73.43%)
Gender relations (Max/min: 2/16)	11.67(±2.55)	11.82(±2.53)	11.51(±2.44)	11.72(±2.74)
Community satisfaction (Max/min: 8/36)	21.29(±5.55)	21.38(±5.57)	21.10(±5.93)	21.45(±4.96)
Social support (Max/min: 12/84)	57.57(±17.77)	57.02(±16.69)	58.77(±17.78)	56.52(±19.12)
Variable	Full Sample	Control	Treatment 1	Treatment 2
Sex work stigma (Max/min: 10/40)	29.84(±7.77)	30.22(±7.31)	30.52(±7.79)	28.34(±8.18)
Alcohol use				
Alcohol dependence	161(29.70%)	57(30.65%)	72(33.80%)	32(22.38%)
Hazardous drinking	88(16.24%)	34(18.28%)	38(17.84%)	16(11.19%)
Variable	Full Sample	Control	Treatment 1	Treatment 2

Drug use				
Ever used drugs	123(22.69%)	38(20.43%)	57(26.76%)	28(19.58%)
Active drug user	89(16.42%)	27(14.52%)	62(17.42%)	21(14.69%)
Asset ownership				
High possession	163(30.07%)	49(26/34%)	67(31.46%)	47(32.87%)
Lower possession	379(69.93%)	137(73.66%)	146(68.54%)	96(67.13%)
Employment status (Employed)	128(23.62%)	53(28.49%)	44(20.66%)	31(21.68%)
Distance to nearest commercial bank				
Less than 2km	115(32.21%)	46(41.44%)	48(32.88%)	21(21.00%)
Greater than 2km	242(97.79%)	65(58.56%)	98(67.12%)	79(79.00%)
Walking to nearest commercial bank (Hours) (Max/min: 0/4)	0.19(±0.39)	0.23(±0.52)	0.15(±0.29)	0.19(±0.33)
Saving goals (Max/min: 5/25)	9.03(±4.59)	9.12(±4.55)	8.68(±4.14)	9.46(±5.23)
Savings				
Money saved anywhere	260(47.97%)	90(48.39%)	106(49.77%)	64(44.76%)
Amount saved (Min/Max: 3000/3100000)	292611.2(±435269)	213377.8(±255280)	179798.1(±405543.2)	129915.4(±348719.3)

Note. Mean(SD) or *n*(%).

Appendix B: Sample Characteristics of the Sample Considered At Baseline (two groups)

Variable	Full Sample	Control	Treatment
Number of participants (N)	542	186	356
Proportion of total sample (%)	100%	34.32%	65.68%
Age (18-55 years)	31.37(±7.18)	31.24(±6.77)	31.44(±7.39)
Marital status			
Married	139(25.65%)	53(28.49%)	86(24.16%)
Separated	331(61.07%)	109(58.60%)	222(62.36%)
Single	72(13.28%)	24(12.90%)	48(13.48%)
Education level attained			
Primary	344(63.47%)	125(67.20%)	219(61.52%)
Postprimary	198(36.53%)	61(32.80%)	137(38.48%)
HIV			
Positive	191(35.70%)	73(39.25%)	118(33.81%)
Negative	344(64.30%)	113(60.75%)	231(66.19%)
Gender relations (max/min: 2/16)	11.67(±2.55)	11.82(±2.53)	11.59(±2.55)
Community satisfaction (max/min: 8/36)	21.29(±5.55)	21.38(±5.57)	21.24(±5.55)
Social support (max/min: 12/84)	57.57(±17.77)	57.02(±16.69)	57.86(±18.33)
Sex work stigma (max/min: 10/40)	29.84(±7.77)	30.22(±7.31)	29.64(±8.01)
Alcohol use			
Alcohol dependence	161(29.70%)	57(30.65%)	104(29.21%)
Hazardous drinking	88(16.24%)	34(18.28%)	54(15.17%)
Drug use			
Ever used drugs	123(22.69%)	38(20.43%)	85(23.88%)
Active drug user	89(16.42%)	27(14.52%)	62(17.42%)
Asset ownership			
High possession	163(30.07%)	49(26/34%)	114(32.02%)
Lower possession	379(69.93%)	137(73.66%)	242(67.98%)
Employment status (Employed)	128(23.62%)	53(28.49%)	75(21.07%)
Distance to nearest commercial bank			
Less than 2km	115(32.21%)	46(41.44%)	69(28.05%)
Greater than 2km	242(97.79%)	65(58.56%)	177(71.95%)
Walking to nearest commercial bank (Hours) (max/min: 0/4)	0.19(±0.39)	0.23(±0.52)	0.17(±0.31)
Saving goals (max/min: 5/25)	9.03(±4.59)	9.12(±4.55)	8.99(±4.62)
Savings			
Money saved anywhere	260(47.97%)	90(48.39%)	170(47.75%)
Amount saved (Min/Max: 3000/3100000)	292611.2 (±435269)	213377.8 (±255280)	334558.2(±500921.6)

Note. Mean(SD) or *n*(%).

Appendix C: Financial Diary Page

DATE		DESCRIPTION	YEAR	EXPENDITURE						