Optimizing The Design And Implementation Of Peer Support Interventions For Adolescents Living With Hiv In Sub-Saharan Africa

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Abstract
Adolescents living with HIV (ALHIV) in sub-Saharan Africa (SSA) face multiple challenges which exacerbate their risks for treatment failure and poor psychosocial outcomes. Peer support interventions can be a mechanism to potentially improve their health outcomes. The purpose of this dissertation was to use innovative approaches to design and evaluate peer support interventions for ALHIV in sub-Saharan Africa, which were explored in three ways. First, an integrated review was conducted to understand the state of the science regarding the efficacy of peer support interventions in improving psychosocial and treatment outcomes among ALHIV in SSA. Second, a hybrid inductive-deductive thematic approach was used to identify implementation determinants regarding the peer delivery of a brief psychological intervention (i.e., Friendship Bench) among ALHIV in Gaborone, Botswana. Our findings provide eight implementation determinants (i.e., six barriers and two facilitators) to consider in future adaptations of Friendship Bench for ALHIV. The six barriers identified were client accessibility, parent disapproval, lack of financial resources, counselor psychological wellbeing, client reticence and confidentiality concerns, and scheduling procedures. The two facilitators were counselors’ perceived value of the intervention and peer delivery of counseling. Third, a behavioral economics design approach (i.e., NUDGE) was used to identify behavioral barriers to antiretroviral therapy adherence among ALHIV in Eswatini, and subsequently design intervention prototypes that peer lay health workers (i.e., expert clients) can use to address these barriers. The following barriers were identified and validated by expert clients: fear of public and interpersonal disclosure of HIV status, anger and lack of acceptance related to delayed HIV disclosure among parents, refusal to receive adherence instructions from adults, and psychological barriers related to food insecurity. Lastly, prototype ideas to address these barriers were developed and vetted by expert clients. Overall, expert clients favored four prototype ideas that they believed were feasible to implement at a low cost: commitment contracts, message framing, group regret lotteries, and messenger type interventions. The overall findings and insights from this dissertation provide the preliminary steps for future work utilizing behavioral economics and implementation science to optimize peer support interventions for ALHIV in SSA.
OPTIMIZING THE DESIGN AND IMPLEMENTATION OF PEER SUPPORT INTERVENTIONS
FOR ADOLESCENTS LIVING WITH HIV IN SUB-SAHARAN AFRICA
Charisse Victoria Ahmed
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This dissertation serves as a tribute to my mother, Carolyn Victoria Bender, who died from AIDS-related complications in 2007. Thank you for always encouraging me to earnestly pursue my career aspirations and to compassionately serve others.
ABSTRACT

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Charisse Victoria Ahmed

Alison M. Buttenheim

Adolescents living with HIV (ALHIV) in sub-Saharan Africa (SSA) face multiple challenges which exacerbate their risks for treatment failure and poor psychosocial outcomes. Peer support interventions can be a mechanism to potentially improve their health outcomes. The purpose of this dissertation was to use innovative approaches to design and evaluate peer support interventions for ALHIV in sub-Saharan Africa, which were explored in three ways.

First, an integrated review was conducted to understand the state of the science regarding the efficacy of peer support interventions in improving psychosocial and treatment outcomes among ALHIV in SSA. Second, a hybrid inductive-deductive thematic approach was used to identify implementation determinants regarding the peer delivery of a brief psychological intervention (i.e., Friendship Bench) among ALHIV in Gaborone, Botswana. Our findings provide eight implementation determinants (i.e., six barriers and two facilitators) to consider in future adaptations of Friendship Bench for ALHIV. The six barriers identified were client accessibility, parent disapproval, lack of financial resources, counselor psychological wellbeing, client reticence and confidentiality concerns, and scheduling procedures. The two facilitators were counselors’ perceived value of the intervention and peer delivery of counseling. Third, a behavioral economics design approach (i.e., NUDGE) was used to identify behavioral barriers to antiretroviral therapy adherence among ALHIV in Eswatini, and subsequently
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CHAPTER 1: INTRODUCTION

Introduction

The provision of health services delivered by laypersons is an essential strategy for expanding access to health services and mitigating the burden of disease in resource-poor settings. Particularly in sub-Saharan Africa, the delivery of HIV services by lay health workers (LHWs) is ubiquitous. Although residents of sub-Saharan Africa make up only 12% of the global population, they account for 71% of the global HIV disease burden (1, 2). Moreover, sub-Saharan Africa accounts for nearly 90% of the global population of adolescents with HIV diagnoses (3). Despite the region’s severe burden of HIV, there are critical shortages of professional health workers throughout sub-Saharan Africa. The average provider-population ratio within the region is 1 nurse to 1,000 people and 1 doctor to 5,000 persons, compared to 14 to 1,000 and 3 to 1,000 nurses and doctors, respectively, in the United States (4-7). The low availability of professional health workers in sub-Saharan Africa precipitated the need for LHWs in HIV service provision (8, 9).

LHWs are laypersons who provide health-promoting services within their communities but have not been professionally trained (10-12). In the realm of HIV care in sub-Saharan Africa, there are several synonyms for LHWs such as community health workers, community volunteers, lay counselors, community caregivers, adherence supporters, and several other terminologies (13). Because adherence to antiretroviral therapy (ART) is crucial for preventing HIV-related morbidity and mortality, much of the work of LHWs in HIV care involves adherence support (13). LHWs engage in a variety of health-promoting activities such as providing HIV adherence counseling and monitoring,
linking newly diagnosed patients to HIV care, and providing HIV treatment and prevention education (13-17). LHWs also improve access to care by providing HIV services that are decentralized from hospital settings to community-based settings (18). Additionally, there is evidence that LHWs can improve psychosocial outcomes such as self-efficacy, a known predictor of ART adherence (19), and quality of life (15, 20). LHWs are also credited for expediting linkage to care and ART initiation, reducing HIV-related stigma, and engaging hard-to-reach populations in care (13, 21). Furthermore, LHWs can play a significant role in mitigating mental health outcomes among people living with HIV. A randomized controlled trial evaluating the effects of lay-delivered problem-solving therapy found significant reductions in depression and anxiety among people living with HIV who participated in the intervention (22).

LHWs are also known for providing cost-effective HIV services in sub-Saharan Africa (20, 23-27). For instance, Fatti and colleagues (24) found that a community-based support (CBS) intervention delivered by LHWs can cost-effectively reduce attrition (i.e., mortality and lost to follow-up) from care among adolescents receiving ART in South Africa. The authors found that CBS costs 50 US dollars per person per year and had an effectiveness between 36% and 42% in terms of reducing chances of attrition, which was deemed cost-effective based on other cost-effective analyses conducted in sub-Saharan Africa (28, 29). Additionally, Nakimuli-Mpungu and colleagues (23) conducted a randomized trial to evaluate group support psychotherapy delivered by LHWs for depression treatment among people living with HIV in Uganda. The authors found that the intervention had a cost-effectiveness ratio of 13 US dollars per disability-adjusted life-year averted, a ratio considered highly cost-effective in Uganda (23).
LHWs can be especially instrumental in alleviating the healthcare burden commonly experienced by nurses. In a systematic review of the assessment of burnout among healthcare providers in sub-Saharan Africa, nurses consistently reported higher burnout scores compared to physicians, midwives, and other healthcare professionals (30). Due to the limited availability of physicians in resource-poor settings, nurses are commonly left with the dual responsibility of carrying out their traditional clinical duties in addition to physician-related tasks—a process known as task shifting (31, 32). Task shifting is defined as the “process of delegation whereby tasks are moved, where appropriate, to less specialized health workers” (33, p. 3). Task shifting from nurses to LHWs is utilized throughout sub-Saharan Africa to alleviate the burden of the overtasked nursing workforce. According to a study evaluating time efficiency among nurses delivering prevention of mother-to-child transmission of HIV (PMTCT) services in Tanzania, over 80% of the time nurses spent on antenatal and postnatal visits can be shifted to LHWs (34). In a nonrandomized clinical trial, deploying LHWs to deliver nurse-related tasks in rural, hard-to-reach communities was associated with a 20% increase in patient visits and a 26.8% increase in patient referrals for complicated (or specialized) services within a 12-month follow-up period (35).

Peer lay health workers (PLHWs) are a type of LHW who uniquely provide peer support services based on a shared experience (e.g., chronic health condition, traumatic event) or attribute (e.g., age, ethnicity, gender). Titles held by PLHWs may include peer counselors, peer navigators, peer educators, peer facilitators, and peer leaders (36). While the responsibilities of PLHWs may overlap with that of LHWs, PLHWs carry a unique status as peers which thereby distinguishes their role as providers of lay health services (37). For instance, expert clients, or expert patients, have substantial
knowledge and self-management skills regarding their health condition and thus provide support to patients with the same condition (21, 38-40). In Eswatini, expert clients are adults living with HIV, ART-adherent, and provide HIV treatment support for their seropositive peers (40). Expert clients are considered PLHWs due to their shared experience as persons living with HIV. In addition, expert clients can be considered LHWs since they do not hold a professional status and are informally trained to perform their job duties (39, 41). Although all PLHWs fall under the umbrella of LHWs, not all LHWs are considered peers.

Like LHWs, PLHWs play a vital role in expanding healthcare delivery access by providing supplemental health promotion services within the healthcare system or serving as proxies for professional healthcare providers (42-44). Peer support interventions are derived from three traditions of support provided by lay persons, one of which is the lay caregiver tradition (45). The lay caregiver tradition is of interest within this dissertation since it is a practice that has endured in the context of scarce availability of professional workers and has also existed prior to the practice of modern medicine (46, 47). The lay caregiver integrates spiritual and practical understandings of health and disease (45). The provision of lay caregiver support has been naturally practiced to meet the needs of underserved communities in high-income countries and to strengthen healthcare systems in low-resourced countries (48, 49).

Peer-led interventions show promising effects on HIV-related treatment outcomes across the globe. According to the World Health Organization’s recent guidelines, peer support for people living with HIV is an empirically supported practice that improves retention in HIV care (50). A recent meta-analysis confirms that peer support is an effective mechanism for improving ART initiation, ART adherence, and
retention in HIV care across low- and middle-income countries (LMICs)\(^1\) and high-income countries (51). Furthermore, results from a randomized controlled trial reveal that psychosocial and adherence support provided by PLHWs can significantly reduce the risk of HIV treatment failure in Ugandan adults (52). Lastly, there is evidence that peer support can be beneficial for adolescents living with HIV (ALHIV). For example, an intervention led by adolescent-aged PLHWs, known as community adolescent treatment supporters, was found to improve rates of viral suppression, an indicator of ART adherence, in Zimbabwean adolescents (53).

**Phenomenon of Interest**

The primary phenomenon of interest in this dissertation is peer support interventions for ALHIV in sub-Saharan Africa. ALHIV in sub-Saharan Africa undergo multiple challenges that compete with the need for optimal medication adherence and treatment continuity, such as HIV-related stigma, poverty, malnutrition, limited and/or inconsistent social support, orphanhood, and depression (54-56). Depression and post-traumatic stress disorder are common mental health issues among this population (57-60). Moreover, this population experiences a myriad of psychosocial challenges that are associated with mental health impairment such as neglect, poverty, violence, stigma, and AIDS-related orphanhood (54, 61-63) Exacerbating these poor outcomes, mental health problems are significant drivers of HIV medication non-adherence (64), poor

\(^1\) According to the World Bank, 47 of the 48 sub-Saharan African countries fit into the low- and middle-income category.
retention in HIV care (65), and sexual risk behaviors (56) among this population. Further, when compared to other age groups, adolescents are more likely to experience poor treatment adherence and less likely to be virally suppressed (66-69), thereby increasing their risk for drug-resistant HIV mutations, AIDS-related mortality, and onward HIV transmission (70-73). Therefore, peer support for this population is a paramount need.

In sub-Saharan Africa, there are limited human resources for health available to support ALHIV and protect them from HIV treatment failure and poor mental health outcomes. The literature encapsulates several instances whereby peers intervene to provide psychosocial support among ALHIV (74, 75). Peer support for ALHIV in sub-Saharan Africa has been provided in various settings and contexts, such as individual and group support, community- or facility-based, and in-person or virtual support models (76). However, in general, there are only a few randomized controlled trials specifically evaluating the efficacy of peer support interventions to address adolescent health in LMICs (77). Furthermore, due to the heterogeneity within peer support terminology (76), it is difficult to synthesize evidence regarding the implementation of peer support interventions for ALHIV in sub-Saharan Africa. Lastly, there are limited examples of robust, innovative research approaches used to increase our knowledge regarding the design, implementation, and evaluation of peer support interventions for ALHIV in this context (78).

**Conceptual and Theoretical Framework**

Although there is a wide array of peer support interventions for ALHIV, the conceptual role and theoretical basis for peers involved in health promotion and healthcare delivery is not well-established. Peers involved in health promotion and
service delivery have many meanings in the literature such as lay persons, volunteers, community health workers, facilitator, educator, and health advocate (36). According to Mark and colleagues’ (76) narrative review of peer support for ALHIV in sub-Saharan Africa, peer support interventions for this population are usually not well-defined or described. Although the peer literature is vast, the lack of a unified concept of peers hinders our ability to synthesize evidence regarding their roles and impact which is needed to generate new knowledge applicable to improving healthcare and health outcomes. To address this gap, Dennis (79) provides nurse scientists with a framework to further advance nursing knowledge pertaining to the integration of peers within health-promoting services. Utilizing Walker and Avant’s (80) concept analysis methodology, Dennis (79) proposed to define peer support as “the provision of emotional, appraisal, and informational assistance by a created social network member who possesses experiential knowledge of a specific behavior or stressor and similar characteristics as the target population, to address a health-related issue of a potentially or actually stressed focal person” (79, p. 329). In this dissertation, Dennis’ (79) definition was applied to conceptualize peer support interventions.

Prior to the provision of peer support, the characteristics of peers need to be clearly delineated. Dennis (79) describes the antecedents of peer support by establishing criteria to be met by peers. According to the criteria, peers are defined by mutual identification or shared experiences such as age, ethnicity, health condition, or stressor (79). The author posits that peers providing health-promoting services extend naturally occurring social networks (e.g., family, friends, coworkers) and offer experiential knowledge as gained from personal experiences rather than from professional training (79). These specific characteristics of peers make them
complementary to professionally trained health workers. Paralleling Dennis’ (79) work, Simoni and colleagues (37) conducted a conceptual analysis of peer-based health promotion interventions and proposed a four-part definition of “peer” within this context. Simoni and colleagues’ (37) definition constitute the assumptions applied throughout this dissertation:

1) Peers share significant personal qualities or experiences with their target group, a concept defined by the authors as “peerness.” Using an example provided by the authors, younger age likely constitutes “peerness” among adolescent populations.

2) The core benefit of peer-led health interventions is the experience of peer-to-peer interaction.

3) Peers lack professional status and training within the scope of their practice; and

4) Peers fulfill a health-promoting role under a standardized protocol and work beyond the confines of their personal social networks.

According to Dennis’ (79) definition, there are three attributes of peer support: emotional, informational, and appraisal support. Emotional support involves the development of interpersonal relationships that enable an individual to discuss personal difficulties and stressors, and the provision of empathetic communication as a mechanism to improve and restore self-esteem. Informational support involves providing knowledge and feedback related to problem-solving when personal difficulties require a resolution. Appraisal support entails the provision of affirming care by engaging in motivational communication that encourages resilience through personal difficulties. These three attributes provide the basis for clear peer support conceptualization which was considered in this dissertation. Consistent with Dennis’ (79) conceptualization, there
is evidence that peer support interventions for ALHIV in sub-Saharan Africa utilize emotional, appraisalal, and informational support techniques (40, 76, 81, 82).

Using evidence from the literature, Dennis (79) proposes three modes in which peer support impacts psychological and physical health, which are through direct, buffering, and mediating effect models. Regarding direct effect models, Dennis (79) posits that peer support can directly influence health outcomes by decreasing isolation and feelings of loneliness, providing health education, and discouraging maladaptive behaviors. The buffering effect model means that peer support can buffer, or protect against, the influence of stress on health by encouraging the use of coping strategies and problem-solving techniques. Like Dennis’ (79) proposal, Mark and colleagues (76) provide empirically supported evidence that peer-led interventions have a “buffering effect” on stressors experienced among ALHIV in sub-Saharan Africa such as HIV-related stigma. Mediating effect models refer to how peer support has indirect influences on health by providing observational learning opportunities through role modeling and promoting self-evaluation and motivation through social comparison. According to Dennis’ (79) framework, the expected outcomes of the receiver of peer support are augmenting social networks, preventing health concerns, reinforcing help-seeking behaviors, decreasing barriers to care, and increasing self-efficacy and self-esteem. These expected consequences of peer support offer constructs that can be used for empirical testing.

Dennis (79) also discusses the professionalization of peers, that is peers who receive training to deliver health services and are fully integrated in the healthcare system but are not licensed and professionally trained (i.e., paraprofessionals). Preceding scholars have argued that paraprofessionals may diminish the trustworthiness
and relatability of peers among their target populations (83). On the other hand, Simoni and colleagues (37) posit that peers can serve as paraprofessionals so long as their work meets their proposed peer definition. The conceptual basis for this dissertation ascribes to the latter perspective due to other literature confirming that laypersons who serve as paraprofessionals can still preserve their identity and impact as peers (84-86).

While Dennis (79) and Simoni’s (37) work provides a clear conceptual foundation for examining peer support, a theoretical justification for the inclusion of peers in health-promoting interventions is needed to “inform the training and selection of peers, the implementation of peer-led interventions, and the design of research evaluating them” (37, p. 2). A theoretical underpinning for peer involvement in health promotion activities also corroborates the utility of peers in addressing health behavior and health outcomes. For example, Dickson-Gomez and colleagues’ (87) was able to link principles of the dynamic social impact theory (DSIT) to the successful implementation of a peer-led HIV prevention outreach intervention for high-risk drug users. The theory postulates that communication is more likely to change behavior if the communicator is considered credible and shares similar sociocultural characteristics with the recipient (88). In the context of peer support, DSIT suggests that peer relationships can effectively foster behavior change. Following this theoretical viewpoint, the creditability of peers established through experiential knowledge as well as the mutual identities and experiences of peers make them strong candidates for promoting positive behavior change among ALHIV. Thus, these conceptual and theoretical underpinnings provide a robust framework for examining the design and implementation of peer support interventions for ALHIV in the context of low-resource settings.
Implementation Science

Implementation science is a relatively new discipline which involves the study of methods to promote the integration of scientific evidence into routine healthcare practice (89). The overall goal of implementation science is to improve healthcare delivery and health outcomes by increasing the utilization of evidence-based practices by clinicians and providers of care. An evidence-based practice (EBP) refers to a practice guideline, treatment, or intervention with scientific evidence supporting its efficacy in promoting health or preventing disease (90, 91). It is estimated that EBPs take an average of 17 years to be integrated into routine practice (92). However, even when EBPs are adopted, they are largely underutilized as only half of them are incorporated into usual care (Bauer et al., 2015). Implementation science was developed to address this gap between scientific knowledge and practice by identifying determinants (i.e., barriers or facilitators) of EBP implementation, and developing and evaluating implementation strategies that are informed by determinants (93).

The application of implementation science is critical in LMICs where the use of LHWs is necessary to expand access to EBPs. The implementation science literature traditionally recognizes clinicians and other healthcare professionals as the providers of an EBP (94, 95). In the LMIC context, the delivery of EBPs by peers and other lay persons can be viewed as an implementation strategy to address the inadequate number of professional health workers available to implement them (76, 96). However, there are several gaps in implementation research concerning LMICs and peer support interventions. One of these gaps is that implementation research in LMICs is often conducted in controlled conditions whereby the researcher has a substantial amount of
influence on implementation (97). Another gap is there are only a few peer support implementation studies in the literature, and existing studies often include adult populations only (98, 99). Ryerson Espino and colleagues (100) conducted a qualitative study to examine the barriers and facilitators pertaining to the implementation of a peer support intervention for women living with HIV embedded within a national HIV linkage and retention initiative. However, this study was conducted in a high-income context, which limits its application to LMICs. Another gap is that the implementation of peer support interventions for ALHIV in sub-Saharan Africa are seldom described and operationalized in the literature (76). Although peer support interventions have been widely implemented among ALHIV in sub-Saharan Africa (76), there is a need to expand implementation research evaluating EBP delivery by peers in this context.

Implementation science has important implications for EBP utilization in ALHIV in LMICs. Due to limited research pertaining to the implementation of evidence-based care models for ALHIV in resource-poor settings, policymakers lack sufficient scientific evidence to support the implementation of interventions that specifically meet the needs of adolescents (101). The lack of implementation research for this population leaves policymakers with the option of applying adult care models to adolescent care which may not be contextually appropriate (101). Considering these challenges, a research agenda was recently produced to prioritize the development of implementation science research to explore the specific barriers to effective treatment interventions for ALHIV (101). Although implementation research pertaining to ALHIV is generally sparse, there is a growing body of work on this topic, including collaborative efforts to address the paucity of implementation research among ALHIV in sub-Saharan Africa. The National Institutes of Health’s Fogarty International Center created the Adolescent HIV Prevention
and Treatment Implementation Science Alliance (AHISA) which aims to promote optimal utilization of scientific evidence to address challenges related to the implementation of HIV treatment and prevention interventions for adolescents in sub-Saharan Africa (102, 103).

There are only a few examples of implementation research done pertaining to evidence-based interventions for ALHIV in sub-Saharan Africa. Aarons and colleagues (2021) used a concept mapping approach to determine from AHISA members the factors that impact the implementation of evidence-based HIV prevention and treatment programs in sub-Saharan Africa (104). The authors identified several factors (or determinants) that influence successful implementation of these programs including HIV stigma, adolescent development, and community perspectives. This dissertation adds to this body of work by identifying the implementation determinants of Friendship Bench, which was recently adapted to be delivered by peers to reduce depression and anxiety symptoms among ALHIV in Gaborone, Botswana.

**Behavioral Economics**

Behavioral economics is a relatively new field that intersects knowledge from economics, social psychology, and cognitive psychology to better understand human behavior and decision-making processes (105). Knowledge from the field of behavioral economics, also referred to as behavioral insights, can be used to uncover cognitive biases and heuristics associated with poor health behaviors such as physical inactivity, tobacco smoking, and medication nonadherence (106-109). One behavioral economics strategy used to improve health-related decision-making is the application of “nudges”, a term propagated by Thaler and Sunstein (110). Nudge refers to “any attempt at
influencing people’s judgment, choice or behavior in a predictable way that is made possible because of cognitive boundaries, biases, routines and habits in individual and social decision-making” (111, p. 158).

Behavioral economics provides insights regarding predictable patterns in decision-making which can be leveraged to “nudge” individuals to make decisions that will optimize their health (110). The theory underpinning nudge is libertarian paternalism, a term coined by Thaler and Sunstein (110) which posits that people should have the freedom to choose from a variety of options (i.e., libertarianism) but can be guided towards an option that falls within their best interest (i.e., paternalism). In fact, nudges have been applied to implementation strategies to improve clinician implementation of evidence-based guidelines (112). An example of a nudge is creating an opt-out system whereby individuals are automatically opted into a choice, such as organ donation, unless they decide to opt out. The underlying behavioral economics principle in an opt-out system is choice architecture, which is the act of making a desired choice the default option by changing the way in which choices are arranged (113).

Although sparse, behavioral economics has been applied to understanding and improving antiretroviral therapy (ART) adherence behavior in people living with HIV (107, 114, 115). Linnemayr and Stecher (107) examined the impact of behavioral biases on ART adherence among Ugandan adults; which revealed that overoptimism, present bias, and lack of salient HIV information was associated with 9%, 13% and 17% lower probability of having adherence rates above 90%, respectively. Therefore, the results from this study can guide the design of interventions that address behavioral biases that influence adherence behavior. Additionally, Linnemayr and colleagues (115) evaluated the effects of a behavioral economics intervention to improve ART adherence in
treatment-mature Ugandan adults. The “nudge” used to promote ART adherence in this study was small incentives which were given immediately after the desired behavior was observed. The intervention group receiving the incentives was 23.7% more likely to achieve adherence rates over 90% compared to the control group. Based on behavioral economics theory, small incentives that are given at frequent times are considered more effective at promoting intrinsic motivation and sustaining behavior change when compared to incentives that are based in traditional economics such as larger, infrequent rewards (109, 116).

Although there is evidence supporting the benefits of applying behavioral economics to ART adherence, there is limited behaviorally informed peer support interventions to improve ART adherence among ALHIV in sub-Saharan Africa. To the author’s knowledge, MacCarthy and colleagues (117) provide the only example of an intervention informed by behavioral economics principles and designed to improve ART adherence among ALHIV in sub-Saharan Africa. MacCarthy and colleagues (117) report the results from a text messaging intervention to improve ART adherence among Ugandan adolescents. The intervention was informed by two biases rooted in behavioral economics: reference dependence bias⁴ and optimism bias⁵. The results of this study were derived from a pilot study with an insufficient sample size to detect statistically significant differences between the intervention and control groups, and therefore

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⁴ Reference dependence bias refers to how status quo determines how people evaluate outcomes or express preferences.
⁵ Optimism bias refers to the belief that one is less at risk of a negative event happening to them compared to the rest of the population.
providing inconclusive evidence regarding the efficacy of the intervention. As suggested by the literature, there is more research needed to determine the efficacy of applying behavioral economics principles to peer support interventions for ALHIV. As noted previously, peer support often centers around promoting positive health behaviors. Despite theoretical and empirical support confirming the utility of peers in influencing behavior change, the idea of utilizing peers to nudge ART adherence is rarely explored. Therefore, one of the goals of this dissertation is to fill this knowledge gap.

**Purpose of the Study**

The purpose of this dissertation was to use innovative approaches to design and evaluate the implementation of peer support interventions for ALHIV in sub-Saharan Africa. There are two gaps in the literature that this dissertation addresses: 1) there is limited evidence regarding the factors that influence the implementation of peer support interventions for ALHIV in sub-Saharan Africa, and 2) peer support interventions are largely used to improve health behavior and yet are rarely designed using behaviorally informed approaches. The first and second gaps were addressed by utilizing implementation science and behavioral economics frameworks, respectively. Additionally, two case study examples are discussed below to demonstrate how the first and second gap will be addressed in Botswana and Eswatini, respectively.

**Botswana Case Study**

Botswana, a high middle-income country in the southern region of sub-Saharan Africa, is home to nearly 400,000 people living with HIV (118). With 21% of its population living with the virus, Botswana ranks third as having one of the highest HIV prevalence
rates in the world (UNAIDS, 2019). Additionally, the country’s HIV prevalence among adolescents ranges from 10 to 20% (119, 120). Botswana has fewer than 2 psychologists, psychiatrists, and social workers per 100,000 people (121), yet the prevalence of mental health problems among adolescents is significant. According to the Botswana Youth Risk Behavioural Surveillance Survey, nearly one fourth of school-going adolescents in the country have reported suicide ideation (122). Among youth living with HIV in Botswana, 17% of this population are at risk for a mental health disorder and therefore are in need of additional screening (123).

To address the critical shortage of mental health professionals in the country, Friendship Bench, an evidence-based psychological intervention, was recently adapted for use among adolescents living with or at risk for HIV in Gaborone, Botswana. The Friendship Bench intervention was initially delivered by older adult LHWs in Zimbabwe to treat mood disorder symptoms in adults using problem solving therapy (22, 124, 125). Unlike the traditional Friendship Bench model implemented in Zimbabwe, the Friendship Bench intervention was adapted in Botswana whereby peer counselors were trained to deliver the intervention among ALHIV. Therefore, peer counselors will be the PLHW cadre of interest to explore the factors that influence the implementation of Friendship Bench for ALHIV in Botswana when delivered by peers.

**Eswatini Case Study**

Eswatini (formerly known as Swaziland) is a lower-middle income country in the southern region of sub-Saharan Africa. The country has the highest adult HIV prevalence in the world (27%) as well as a high HIV prevalence rate of 15% among adolescents (126, 127). As part of the country’s adoption of task shifting practices, new
cadres of LHWs were introduced into Eswatini’s formal health sector to expand access to care and mitigate patient workloads among nurses (128). Task shifting to LHWs was one of the main factors that led to the achievement of universal ART access in Eswatini in 2014 (39). Furthermore, nurse-led ART initiation, a task traditionally reserved for physicians, is a common practice within this country, allowing nurses to delegate their traditional tasks, such as adherence counseling (39, 128). As outlined in Figure 1 (Appendix B), three cadres of LHWs commonly involved in HIV service delivery in Eswatini are expert clients, mentor mothers, and lay counselors (21, 128). Although not an exhaustive list of LHWs in the country, these three LHWs play a specific role in providing HIV treatment and prevention services.

The expert client program, established in 2011 in Eswatini, is a peer-based HIV support model adopted in multiple sub-Saharan African countries (21, 129). Expert clients in this country are a cadre of PLHWs who are living with HIV and provide HIV-related peer support in multiple capacities such as ART adherence counseling and tracking HIV patients who have missed a clinical appointment (21, 39, 41). In Eswatini as well as globally (130), adolescents are less likely than their adult counterparts to achieve viral suppression irrespective of exposure to adherence counseling interventions (131). A behavioral economics lens may offer a possible solution to making expert client interventions more effective for adolescents. Therefore, expert clients are the PLHW cadre of interest for exploring the design of intervention prototypes informed by behavioral economics to improve ART adherence behavior among Swazi adolescents.
Study Aims

Guided by the conceptual underpinning of this inquiry, two types of PLHWs were explored: 1) expert clients, or laypersons who function as peers due to their shared experience of living with HIV (e.g., mutual identification by HIV status), and 2) peer counselors, or laypersons who function as peers due to younger age (e.g., mutual identification by age or developmental stage) and/or shared HIV status. To provide contextual exemplars, these phenomena were explored within Botswana and Eswatini. This dissertation comprises the following three aims; each aim was fulfilled in the following three chapters in consecutive order.

1) Aim 1: Characterize and review peer support interventions for ALHIV throughout sub-Saharan Africa and determine the effectiveness of these interventions on ART and/or HIV care retention. The secondary aim of this review was to examine the efficacy of these interventions in terms of improving psychosocial outcomes.

2) Aim 2: Identify determinants of implementation among peer counselors delivering the Friendship Bench intervention to ALHIV in Botswana.

3) Aim 3: Identify behavioral insights pertaining to ART adherence barriers among ALHIV from the perspective of expert clients in Eswatini, and design intervention prototypes that expert clients can use to address these barriers.

Definitions of Key Terms

There are several key terms that will be referenced throughout this dissertation. To provide contextual clarity, these terms are provided below with their corresponding definitions:
1) Adolescence: The transitional period between childhood and adulthood that is traditionally recognized as falling between the ages of 10 to 19 years of age. However, Sawyer, Azzopardi, Wickremarathne, and Patton (132) propose a more expansive definition to include ages 20 to 24—conventionally considered the ages for young adults. Sawyer and colleagues (132) argue that the 10 to 24 age range “aligns more closely with contemporary patterns of adolescent growth and popular understandings of this life phase” (p. 223). Therefore, individuals falling between the 10 to 24 age range was considered adolescents throughout this dissertation.

2) Attrition: Not being retained in HIV care due to death or lost to follow-up.

3) Peerness: the sharing of significant personal qualities or experiences with a target group such as age, ethnicity, stressor, and/or health concern (37).

4) Retention in HIV care (or treatment retention): Alive and on ART at a specified timepoint.

5) Viral rebound: A documented detectable viral load after previous documentation of viral suppression (133).

6) Viral suppression (or suppressed viral load): The achievement of an undetectable viral load or in other words when copies of HIV cannot be detected by standard viral load tests. The minimal number of copies per milliliter of blood used to determine an undetectable viral load varies based on assay sensitivity (133, 134).

7) Virologic (or treatment) failure: failure to maintain viral suppression while on antiretroviral therapy.
Summary

Dennis’ (79) concept analysis of peer support offers nurse scientists a conceptual framework for “improving the development, implementation, evaluation, and comparison of peer interventions and their impact on health, health behaviors, and health-service utilization” (p. 329). There is a need to develop, implement, and evaluate peer support interventions that are uniquely tailored to meet the needs of ALHIV in sub-Saharan Africa. Therefore, Damschroder and colleagues’ (135) Consolidated Framework for Implementation Research (CFIR) was used to evaluate the implementation of Friendship Bench delivered by peers (Chapter 3), and behavioral economics approaches were used to inform the design of peer support intervention prototypes (Chapter 3) for this population. The aims of this dissertation were addressed in a three-paper format. Paper 1 (Chapter 2) is an integrative review of peer support interventions for ALHIV in sub-Saharan Africa. Paper 2 (Chapter 3) is a qualitative study evaluating the determinants of Friendship Bench implementation by peers of ALHIV in Botswana by using CFIR and an innovative thematic analysis approach (i.e., hybrid inductive-deductive analysis). Paper 3 (Chapter 4) is another qualitative study using a novel behavioral design approach (i.e., the NUDGE framework) to identify behavioral barriers of ART adherence among Swazi adolescents and subsequently develop intervention prototypes to be used by peers to address these barriers. Chapter 5 provides a conclusion of the findings from this dissertation with implications for future research and practice.
CHAPTER 2: AN INTEGRATIVE REVIEW

Introduction

Despite widespread availability of life-saving antiretroviral therapy (ART) in sub-Saharan Africa, AIDS remains one of the leading causes of death among adolescents living with HIV (ALHIV) in sub-Saharan Africa (136, 137). Adolescents in this region continue to fare poorly with regard to ART adherence and viral suppression (55, 66, 68, 69, 138, 139). Additionally, older adolescents (aged 15 to 24 years) are at a higher risk of non-retention in HIV care compared to younger adolescents and children (140-143). Furthermore, 88% of ALHIV reside in sub-Saharan Africa (3), and nearly 90% of the HIV-associated deaths in 2016 occurred among adolescents in Eastern and Southern Africa (136). ALHIV face unique circumstances that may explain their risk for poor treatment outcomes such as HIV-related stigma, pill burden, violence exposure, orphanhood, unstable caregiver support, and limited access to adolescent-tailored HIV services (54, 144, 145).

It is well-documented that ALHIV in sub-Saharan Africa are susceptible to negative psychosocial outcomes such as depressive symptoms, anxiety, suicidality, social isolation, violence, discrimination, and internalized stigma (56, 57, 60, 61, 63, 146-151). Although these outcomes are known predictors of medication non-adherence among this population (55, 64, 138, 152-154), there remains a limited number of interventions to address this problem (155). Due to the close intersection between HIV status and psychosocial outcomes among ALHIV, mental health problems may also intensify their risk for poor treatment retention. According to Rooks-Peck and colleagues' (65) meta-analysis, a mental health history or symptoms was significantly associated
with lower odds of HIV treatment retention. However, peer support has the potential to buffer the psychosocial challenges among ALHIV (62, 150), which may therefore improve their treatment outcomes. Additionally, peer-facilitated medication adherence interventions show potential for success among adults living with HIV (156), which may also hold true for adolescents.

There is limited synthesized evidence regarding the efficacy of peer support interventions for ALHIV in sub-Saharan Africa. According to Berg and colleagues’ (51) meta-analysis, peer support can improve HIV treatment outcomes among adult populations across low- and high-income settings, but the review provides no evidence of this effect among adolescent populations. Although there are several reviews that consolidate evidence regarding interventions for ALHIV (75, 155, 157-163), they do not exclusively evaluate the efficacy of peer support interventions. However, other reviews indicate that peer support interventions can potentially improve health outcomes among adolescents with other chronic illnesses (164, 165). Peer support interventions for people living with HIV often center around promoting ART adherence and retention in HIV care (41, 51, 53, 76, 166, 167). Therefore, determining the impact of peer support interventions on adherence and retention outcomes among ALHIV can provide implications for future intervention research targeting this population.

**Aims of the Review**

The overall purpose of this paper is to review the state of the science regarding interventions to improve ART adherence and/or HIV care retention among ALHIV throughout sub-Saharan Africa. The primary aim of this review is to describe the impact of peer support interventions in improving treatment outcomes (i.e., ART adherence and
retention in HIV care) among ALHIV in sub-Saharan Africa. The secondary aim of this review is to determine whether these interventions may be efficacious at improving psychosocial outcomes in addition to treatment outcomes.

Methods

**Integrative Review Methodology**

Whittemore and Knafli's (168) integrative review methodology was selected as it provides a rigorous approach to synthesizing literature within health-related disciplines. One benefit of this methodology is that it allows for the consolidation of various study designs. Due to the scarcity of research and practice paradigms pertinent to improving HIV and mental health outcomes among ALHIV, an integrative review may offer holistic insight into the empirical evidence regarding this phenomenon.

**Literature Search**

A systematic literature search of peer-reviewed primary sources retrieved from three databases—PubMed, CINAHL, and Embase—was conducted in December 2021 (see search strategy in Appendix C). These databases were recommended by a university medical librarian for searching original research articles within health-related fields. The search strategy was adapted from similar reviews (159, 160), but revised as suggested by the librarian to include additional key words that were deemed relevant for the search such as terms related to adolescence (e.g., adolescent, youth, pediatric, teen) and sub-Saharan African countries. The search did not include studies published before 2004 since global ART coverage expansion began during this year (169). The
literature search was completed by the primary author, and to improve the reliability of the search, a research assistant replicated the screening process (i.e., title/abstract screen and full-text screen). Discrepencies in the screening process were discussed and resolved by mutual agreement.

**Inclusion Criteria**

The following inclusion criteria were used in this review: (1) original research published in a peer-reviewed academic journal; (2) evaluation of a single intervention with one or more components; (3) any study evaluating the effects or associations of the intervention on ART adherence and/or retention; and (4) inclusion of adolescents in between the ages of 10 and 24 with outcome data exclusively for this age group, or reported age-disaggregated outcome data. Since psychosocial factors (e.g., social support, stigma, depression, anxiety, etc.) were considered a secondary outcome in this review, studies reporting this outcome were included only if the primary outcome (i.e., ART adherence and/or retention) was also reported. Psychosocial outcomes were defined as any measurement used to evaluate psychological or social wellbeing such as depressive symptoms, anxiety, post-traumatic stress, emotional disturbances, trauma exposure, enacted or internalized stigma, social support, social isolation, hope, self-esteem, self-worth, and quality of life.

Dennis’ (79) conceptual definition of peer support was used to identify peer support interventions during the literature search. According to Dennis (79), peers providing support share salient characteristics with their beneficiaries such as age, ethnicity, stressor, and/or health concern (79). Peer support can be the primary intervention or one component of a comprehensive program (79). Peer support can
occur through several modes of interaction such as one-on-one sessions or support
groups (79). Interventions that met these criteria were included in this review.
Additionally, Dennis (79) described three defining attributes of peer support:
informational support (i.e., the provision of resources, education, or feedback), emotional
support (i.e., attentive listening, esteem building, and encouragement), and appraisal
support (i.e., promoting self-evaluation and resilience). To capture additional types of
support that may be described in the literature, our inclusion criteria for peer support
interventions were not limited to Dennis’ (79) defining attributes.

The operational definitions for ART adherence and retention were adopted from
similar reviews (159, 160). Per Murray and colleagues’ (160) systematic review,
retention measures were defined as “retention in care (alive and on ART at a specified
timepoint), lost to follow-up (LTFU; not retained in care at a specified timepoint), attrition
from care (not retained in care due to death, LTFU or default), and appointment
attendance (number of attended appointments out of total possible)” (p. 4). Regarding
ART adherence, Ridgeway and colleagues’ (159) definition was considered in this
review: viral load, measures of drug concentrations, self-reported adherence using either
novel or validated measures, pill counts, and data from electronic adherence monitoring
devices. Eligible studies had to include one or more of these defined outcome measures.

Exclusion Criteria

Studies excluded from this review were those published in a language other than
English, dissertations, abstracts, theoretical articles, expert opinion pieces, reviews, and
other forms of non-original research. Since peer support interventions with obscure
definitions are difficult to replicate and synthesize with the available evidence, studies
that lacked a clear description of peer support activities within the intervention were not included in this review.

Data Abstraction and Analysis

Whittemore and Knaff’s (168) data analysis process requires an interpretive strategy of moving categories into higher levels of data abstraction to draw relevant and accurate conclusions regarding the primary sources included in the review. Outcome variables, study design, and other study characteristics were extracted and compiled into tables to facilitate visual interpretation (i.e., table of evidence). Concerns regarding internal and external validity in the studies were included in the table of evidence.

Data Quality Evaluation

A standardized approach to evaluating the methodological quality of primary sources included in an integrative review may be challenging due to the inclusion of varying study designs. For this reason, data quality evaluation in integrative reviews often requires the use of more than one quality appraisal tool. Therefore, the Joanna Briggs Institute (JBI) critical appraisal tools were used to evaluate the methodological quality of the included studies in this review. JBI critical appraisal tools provide checklists that are specific to study design (e.g., randomized controlled trials, cohort studies, etc.). Due to the limited evidence supporting interventions for ALHIV relevant to improving treatment outcomes in sub-Saharan Africa, no articles were excluded on the basis of low methodological quality. All included studies were given a quality rating of “high,” “moderate,” or “low”. Scoring ascribed to these ratings was specific to the JBI checklist used. For reliability purposes, a research assistant independently reviewed all included
articles to confirm agreement in the scoring. Disagreements in the scoring were discussed and resolved by consensus.

Results

Study Characteristics

As the PRISMA flow diagram illustrates in Figure 2 (Appendix B), a total of 4,193 citations were identified from the database search. After duplicates were removed, 3,217 citations underwent a preliminary screening of title and abstracts, as guided by the inclusion and exclusion criteria of this review. A secondary screening of 123 full-text articles occurred after 3,094 ineligible articles were excluded following the title and abstract screen. After the 123 full-text articles were assessed for eligibility, 17 citations met the inclusion criteria. After a bibliographic search of similar reviews (157, 159), three additional eligible studies were identified (170, 171). Therefore, the final search yielded a total of 19 articles meeting the inclusion criteria for this review (81, 170-187).

The included studies were published between 2016 and 2021. Most of the eligible studies were randomized controlled trials (81, 172-174, 176, 178, 182) followed by retrospective cohort studies (170, 171, 179-181, 187). Adolescent sample sizes ranged from 22 to 952; two studies reported age-disaggregated results for adolescents within a larger sample that included children or adults (170, 181). Comparison groups typically received standard of care only, which was usually determined by country-specific Ministry of Health guidelines. Additionally, the table of evidence (Table 1 in Appendix A) provides a description of the interventions, outcome measures, key findings, and study quality ratings.
Most (n=15) of the studies included in this review were deemed moderate with regard to methodological quality. Common methodological issues identified were sample sizes that were insufficient to detect intervention effects, randomization allocation flaws, lack of a control group, relevant confounders unaccounted for in data analyses, short post-intervention follow-up periods, lack of a comparison group, missing data or poor data quality, and adherence outcome measures with limited reliability such as pill counts and self-reported ART adherence.

**Adherence and Retention Outcome Measures**

Fourteen and twelve of the included studies reported adherence outcomes and retention outcomes, respectively. Measures of adherence used in the included studies were viral load (170, 173-175, 178, 180-182, 185, 187), self-report (81, 172-174, 184, 186), pill counts (180), medication possession ratios (MPR) derived from pharmacy refill data (185), and hair ART concentration (174). Viral suppression outcomes were measured differently across studies, including different cutoffs for characterizing virological failure. Measurement tools used for self-reported adherence were the Visual Analog Scale (175, 185), the AIDS Clinical Trials Group adherence questionnaire (172), and the Case Adherence Index (184).

Studies measuring retention outcomes used different criteria for determining retention in care, including varying definitions for lost to follow-up (LTFU). One study measured retention by self-report using a five-point Likert scale (81) while the remaining studies relied on client tracking by lay health workers and/or clinical records. Retention was measured by one study as adherence to appointment scheduling such as returning to the clinic before running out of medications received at the last appointment (176). Others defined retention by attendance at a clinical appointment within a given time
period which typically ranged from three to six months (176, 185, 187). Definitions for LTFU (or not retained in care) included failing to attend a scheduled clinical appointment within a given time frame which ranged from over 28 days to over 12 months (170-172, 177, 179, 181). Retention was also defined as on ART at 3 and 6 months after being diagnosed (183). One study considered death a retention outcome (178).

Psychosocial Outcome Measures

Six studies reported psychosocial outcomes as defined by the eligibility criteria of this review. Four studies utilized the Patient Health Questionnaire (PHQ-8 or PHQ-9) to measure depression symptoms (172, 174, 178). Mavhu and colleagues (178) used the Shona Symptom Questionnaire (SSQ-14) to measure common mental disorders such as depression and anxiety. In addition to using the PHQ-9, Dow and colleagues (174) also used the Strengths and Difficulties Questionnaire (SDQ) to measure emotional and behavioral symptoms, and also used the UCLA Post Traumatic Stress Symptoms Exposure Screener and Reaction Index (i.e., UCLA Trauma) survey to measure trauma-related symptoms. On the other hand, Willis and colleagues (81) measured self-reported confidence, self-esteem, self-worth, and quality of life. Stangl and colleagues (184) also measured hope for the future using the 12-item Hope Scale. Dulli and colleagues (172) measured social support and social isolation using the Medical Outcomes Study-Social Support Survey and Patient-Reported Outcomes Measurement Information System (PROMIS) Social Isolation Scale, respectively.

Of the seven studies reporting psychosocial outcomes, four studies evaluated stigma (81, 172, 173, 178, 184). Stangl et al. (184) measured enacted and internalized stigma using the 14-item Stigma Scale for Chronic Illness and modified the scale by specifying HIV as the chronic illness. Denison et al. (173) utilized the Internalized AIDS
Stigma Scale (IA-RSS) which measures feelings of guilt, shame, or worthless related to one’s HIV status. Dulli et al. (172) and Dow et al. (174) measured perceived HIV-related stigma using an abbreviated version of Berger et al.’s (188) 40-item HIV Stigma Scale. Mavhu et al. (178) measured perceived stigma using the HIV/AIDS Stigma Instrument-People living with AIDS (HASI-P). Although Willis and colleagues (81) measured stigma, the authors did not use a standardized instrument and did not specify whether they were measuring enacted and/or internalized stigma.

**Peer Involvement**

Each intervention had varying degrees of peer involvement. Peer group activities were the most common such as adolescent support groups with educational components (177, 179, 180, 186), ART adherence clubs (170), and adolescent clinic days with educational and/or recreational group activities (171, 187). Galárraga et al. (175) specifically evaluated the efficacy of a conditional economic incentives intervention that involved compensation based on clinical attendance and viral load averages of a peer group. Twelve studies (81, 171-174, 178, 181-186) evaluated interventions that involved delivery of a particular service by a peer lay health worker (PLHW), most of which were adolescents or young adults living with HIV themselves. PLHW services included facilitation of a peer group (171-174, 184), home visits (81, 178, 182), adherence counseling or monitoring (81, 178, 181, 182), education (171, 176, 186), and navigation of services (183, 185). PLHWs had several titles such as peer navigators (185), peer educators (171, 183, 186), peer facilitators (184), group leaders (174), youth peer mentors (173), and community adolescent treatment supporters (81, 178, 182). Some authors described peer support interventions involving expert clients, or ART-
adherent patients living with HIV, who were involved in peer navigation (177), health education (176), and ART adherence counseling (181).

**Intervention Characteristics**

Three distinct interventions were guided by a theoretical or conceptual framework. Guiding theories included the social cognitive theory (173, 175) and unified theory of behavior (81, 178, 182). Vu and colleagues (186) used the human rights framework to guide their intervention. Each study was classified by the type of peer support provided in the intervention assessed; the intervention types were created inductively by the author. The definitions of each intervention type are outlined in Table 2 (Appendix A), and study outcomes are reported by intervention type in the following sections.

**Group-Based Support**

Group-based peer support was the most common intervention type evaluated (170-172, 175-177, 179, 180, 184, 187). For example, Teen Club was evaluated in three moderate quality retrospective studies (177, 179, 180). Teen Club is a peer support group for ALHIV which comprises recreational and educational activities (177, 179, 180). Munyayi and van Wyk (180) reported no differences in clinician-measured adherence (i.e., pill counts) and viral load between adolescents participating in Teen Club and those receiving standard care after 24 months in Namibia. However, there is conflicting evidence regarding the effect of Teen Club on retention in care. MacKenzie and colleagues (177) found that Teen Club members in Malawi were more likely to be retained in care versus patients with no Teen Club exposure. Conversely, Munyayi and van Wyk (179, 180) reported no statistically significant differences in retention rates among Teen Club participants in Namibia after 24 months. However, MacKenzie et al.
and Munyayi and van Wyk’s (179, 180) studies have several limitations that compromise the validity of the findings—retrospective design features which relied on routinely collected data with questionable reliability, and no controls for missing data thus limiting the accuracy of the dose exposure and reporting of outcomes. Furthermore, retention in care was measured differently across studies, and selection bias is possible since the exposed and unexposed groups were not randomized.

Three moderate-quality studies evaluating clinical interventions that included group-based peer support show little promise in improving adherence or retention outcomes (171, 175, 176, 187). According to Zanoni and colleagues’ (187) retrospective study, ALHIV attending an adolescent-oriented clinic with peer support services in South Africa had higher retention and higher rates of viral suppression than those who attended a standard pediatric clinic. However, Teasdale and colleagues’ (171) retrospective study revealed that facilities offering support and educational programs run by peers showed no improvements in retention outcomes relative to the control group. However, these outcomes may have been impacted by the duration of the follow-up periods. For instance, Teasdale et al.’s (171) retention outcomes were based on 12-month period following ART initiation whereas Zanoni et al. (187) relied on outcome data among adolescents receiving ART for a median of 73 months. Galárraga et al.’s (189) pilot study evaluated a conditional economic incentives intervention among in-clinic peer groups, and the authors found no significant changes in viral load after a 6-month follow-up period.

Two low to moderate quality studies evaluated group-based peer support interventions in community settings (184, 186). Stangl et al.’s (184) pilot study measured the preliminary efficacy of a curriculum-based support group among a small sample of
adolescent females in Zambia comprising six sessions facilitated by two peers living with HIV. Self-reported ART adherence scores decreased after exposure to the intervention, but the differences were not significant. Stangl and colleagues (184) found no significant changes in internalized stigma among participants at baseline and endline. Grimsrud and colleagues (170) evaluated community-based adherence clubs (CACs) whereby patients met every two months for group counseling, symptom screening, and distribution of ART. The authors found that risk of LTFU did not differ significantly among adolescents in CACs and adolescents not enrolled in CACs. The authors also found that adolescents involved in CACs were twice as likely to be LTFU and experience viral rebound compared to adults (170).

Dulli and colleagues (172) conducted a moderate-quality randomized trial to test the efficacy of an online support group facilitated by adults living with HIV. Although sufficiently powered, the authors found no effects on ART adherence and retention among adolescents aged 15 to 24 years (172). The authors also found no effects on psychosocial measures, specifically social support, stigma, depression, and social isolation (172). Graves and colleagues’ (176) moderate-quality RCT tested the efficacy of a family-based clinical intervention which included peer-led health education sessions for ALHIV and their caregivers; the sessions were led by expert clients. Although sufficiently powered, adolescents attending facilities implementing this intervention did not differ significantly in the odds of retention when compared to adolescents attending control facilities (176).

*Individualized Plus Group-Based Support*

Six studies evaluated the efficacy of individualized plus group-based peer support (81, 173, 174, 178, 182, 186). Three studies specifically evaluated the *Zvandiri*
program in Zimbabwe, a package of psychosocial support services provided by adolescent-aged PLHWs (81, 178, 182). Willis and colleagues (81) found that intervention exposure to Zvandiri was associated with a self-reported increase in ART adherence from 44.2% at baseline to 71.8% at endline among ALHIV. The authors also observed declines in stigma which were not statistically significant, but also found statistically significant improvements in self-esteem, confidence, self-worth, and quality of life after intervention exposure. However, we judged Willis’ (81) study to be of low methodological quality due to several limitations to the study design and outcomes such as nonreliable measurements of adherence, small sample sizes for the control and intervention groups, and randomization at the site level.

On the other hand, Mavhu et al.’s (178) high-quality RCT addresses some of the methodological weaknesses found in Willis’ (81) study and reported efficacious results after exposure to the Zvandiri program. The authors found that virologic failure and death were less likely in the intervention group versus the control group at endline, or 96 weeks (178). With regard to psychosocial outcomes, Mavhu and colleagues (178) did not find a statistically significant difference in all psychosocial outcomes measured (i.e., depression and anxiety symptoms, perceived stigma) after 96 weeks. Like Willis et al. (81), Mavhu et al. (178) utilized cluster randomization which prevents contamination but has other limitations such as selection bias and concerns regarding generalizability. Ndhlovu et al.’s (182) RCT evaluated the same intervention and the authors reported no difference in having a detectable viral load between the intervention and control groups over a 36-week period. However, there was possible contamination between the intervention and control groups and high levels of drug resistance among the study sample. Unlike the former trials (81, 178), Ndhlovu and colleagues (182) did not use
cluster randomization but rather individually randomized participants at a large referral hospital.

Three moderate-quality studies evaluating individualized plus group-based peer support interventions show some promising results (173, 174, 186). Denison and colleagues’ (173) RCT evaluated a clinic-based intervention led by youth peer mentors in Zambia and found that the intervention group had a 4.7-fold increase in odds of viral suppression compared to the control group within a single pediatric clinic. The authors also found that the intervention was associated with a significant reduction in internalized stigma relative to the comparison arm (173). However, the intervention did not lead to significant changes in viral suppression in two adult clinics, possibly because adolescents transitioning to the adult clinics from a pediatric site were required to have a suppressed viral load prior to the transition and before exposure to the intervention (173). Dow et al. (174) conducted a pilot RCT of an intervention led by adolescent and young adult group leaders, and virologic suppression rates increased from 65% to 75% in the intervention arm and remained the same in the control arm after six months of follow-up. A unique feature of Dow et al.’s (2020) study is the inclusion of hair ART concentration levels as an adherence outcome; the study found increased hair ART concentrations and low log viral loads amongst the treatment group relative to the control group. Additionally, Dow and colleagues (174) reported significant reductions in PHQ-9 scores in the intervention group compared to the control group. Dow et al. (174) also found reductions in trauma and emotional-behavioral symptoms among the intervention arm compared to the control arm, but found minimal reductions in internalized stigma in the intervention arm. Vu et al. (186) used a pre/post quasi-experimental design to evaluate a community-based support group that involved peer
educators; the authors found significant improvements in self-reported adherence after a 9-month intervention period.

*Individualized Peer Support*

Three low to moderate quality studies evaluated interventions that included individualized peer support mechanisms (181, 183, 185). In Nasuuna and colleagues’ (181) retrospective cohort study, there were no significant differences between adolescents virally suppressed and unsuppressed after individually receiving three adherence counseling sessions led by expert clients. However, Nasunna’s (181) study was deemed low in quality due to several methodological weaknesses such as not controlling for drug resistance, unreliable outcome data, and small sample size. Ruria and colleagues (183) conducted a pre-post evaluation of an intervention with tailored peer navigation services. Retention significantly increased from 66% to 90.0% after three months, and significantly increased from 54.4% to 98.6% after six months. However, this study was rated low in methodological quality for several reasons such as the lack of a concurrent control group and unreliable outcome data. Taiwo and colleagues (185) conducted a single-arm pilot study, rated moderate in methodological quality, to evaluate a CDC-informed combination intervention consisting of daily two-way text message medication reminders plus tailored peer navigation. The authors found that the proportion of adolescents achieving viral suppression increased from 35% at baseline to 68% at 24 weeks, and was 60% at 48 weeks (185). Additionally, the authors found that retention among enrolled participants decreased from 98% to 88% within a 24-week observation period, but baseline retention rates were not reported by the authors (185).
Discussion

This integrative review outlines the current state of the science regarding peer support interventions aimed to improve treatment outcomes among ALHIV in sub-Saharan Africa. Although several reviews have synthesized evidence regarding the efficacy of interventions for this population (75, 155, 157-163), this review adds a unique lens by specifically highlighting interventions that involve peer support. We identified several avenues in which peer support can be provided to ALHIV—individualized peer support, group-based support, and individualized plus group-based support. However, results regarding the efficacy of these interventions are mixed and most of the studies included were deemed moderate in methodological quality.

Although studies evaluating group-based peer support interventions were the most common, most of these studies were not associated with retention, adherence, or psychosocial outcomes (170-172, 175, 176, 179, 180, 184). Furthermore, three studies included in this review suggest that group-based peer support interventions may not be effective for older adolescents (170, 177, 179). Two included studies evaluating Teen Club indicate that older adolescents, aged 15 to 19 years, who participated in this intervention experience attrition from care at higher rates than younger Teen Club participants (177, 179); this finding is consistent with results from similar studies not included in this review (140-143). Likewise, Grimsrud and colleagues (170) found that adolescents older than 15 years of age who participated in community-based adherence clubs were more likely to be LTFU than adult participants. However, these studies were retrospective in nature, and thus we have no evidence regarding the causality of these
findings. Nonetheless, these findings suggest the need for interventions to guide adolescents during the transitional period between older adolescence and adulthood.

Studies evaluating individualized plus group-based peer support interventions provide the most promising evidence for improving ART adherence outcomes among ALHIV in sub-Saharan Africa. Most of the studies evaluating this intervention type reported favorable adherence outcomes (81, 173, 174, 178, 186), two of which were statistically powered RCTs. Across these studies, most peer supporters were adolescents or young adults living with HIV, suggesting the potential benefit of using young seropositive peers to promote adherence among ALHIV. However, most of the studies evaluating individualized plus group-based support interventions in our review were pilot trials with small sample sizes (57, 81, 186). Robust trials that address these limitations are needed to confirm the effectiveness of these interventions.

There is insufficient evidence supporting the efficacy of individualized peer support for ALHIV in sub-Saharan Africa. Two of our included studies suggest that individually tailored peer navigation services may improve adherence and retention outcomes (183, 185), but methodologically robust trials are needed to confirm efficacy. Taiwo and colleagues (185) found favorable adherence and retention outcomes associated with a text messaging plus peer navigation intervention, but they conducted a single-arm trial with a small sample size. A robust three-arm RCT evaluating a similar intervention among South African adults demonstrated efficacy in improving retention (190), thus providing implications for the potential success of Taiwo’s (185) intervention if trialed using a similar design. We identified only one study that evaluated individualized adherence counseling provided by peers (181), but the intervention was not associated with improved viral load outcomes. Similarly, a retrospective study not
included in this review found that adherence counseling sessions had no effect on viral load status among ALHIV in Eswatini (131). While these findings may suggest that single-component counseling interventions may be insufficient for ALHIV, high-quality studies with fully powered randomized designs are needed to verify these results.

*Implications for Future Research*

There is a need for more peer support intervention research that integrates psychological outcomes in evaluations of treatment outcomes among ALHIV in SSA. Only six of the 19 studies in our review evaluated psychosocial outcomes (57, 81, 172, 173, 178, 184). Three of these studies did not observe any improvements in psychosocial outcomes after intervention exposure (172, 178, 184); of these three studies, only one of them reported findings from a high-quality RCT (178). Peer delivery of psychotherapies and other psychological interventions have shown efficacy in improving psychosocial outcomes among other populations (191, 192), and therefore can be explored among ALHIV in future work. Additionally, exploring peer-led mental health interventions will fill a gap in the literature. Bhana and colleagues’ (193) literature review confirms the dearth of mental health interventions for ALHIV within low- and middle-income countries.

Researchers can explore family-based interventions delivered by peers to address treatment and psychosocial outcomes among ALHIV. We identified only one family-based intervention that included the provision of peer support, but the intervention did not demonstrate efficacy in improving retention outcomes among ALHIV (176). However, the integration of peer support in family-based interventions may be an important consideration for two reasons. First, adolescent treatment and psychological outcomes can be influenced by caregiver and parental relationships (54). Two, peers
can potentially enhance their interventions by also supporting caregivers through education and family navigation (194, 195). Interventionists may consider adapting family-based interventions to strengthen existing peer support interventions for ALHIV. For instance, Suubi+Adherence is a family-based economic empowerment intervention that demonstrated efficacy in improving viral suppression and mental health outcomes among ALHIV in Uganda (196-199). We can test whether peers can successfully adapt these interventions in future research.

We may also consider incorporating behavioral economics (BE) strategies into peer support interventions for ALHIV. Incentives are BE strategies and have been utilized to improve medication adherence among adults living with HIV and within the context of other health conditions (108, 115, 200-202). In this review, we identified a peer support intervention using group-based incentives which was not associated with improved adherence (175), but the study was only a pilot trial. Although not included in this review, a text messaging intervention showed some promise in improving medication adherence among ALHIV in Uganda (117). However, more research is needed to determine the utility of leveraging peers to deliver behavioral economics strategies.

Limitations of the reviewed studies

Most of the studies included were low to moderate in methodological quality with only one high-quality study included. A substantial number of the studies had critical weaknesses such as sample sizes that were not powered to detect intervention effects and unreliable outcome measures. Several studies were pilot randomized trials or relied on routinely collected data from patient medical records without using methods to account for missing data. The low-quality studies have significant methodological flaws
such as data analyses that did not account for relevant confounders. Another limitation was inconsistent or lack of a clear description of how survey tools were validated cross-culturally. Lastly, the operationalization of outcome measures varied substantially among the studies, thus making it difficult to synthesize knowledge regarding intervention effects.

**Limitations of the review**

Several limitations were identified within the process of conducting this review. Some studies evaluated multi-component interventions in which peer support was only one component, but the non-peer components may also have an impact on efficacy. Additionally, the quality ratings ascribed to each article are subjective. However, standardized checklists were used to keep the ratings of each article as consistent as possible. Another limitation is that studies that merely assessed psychosocial outcomes were not included in this review. Due to the complexities of synthesizing intervention studies with various study designs and varying degrees of methodological rigor, the conclusions made are not definitive. Additionally, programmatic data published in the grey literature was not included which may have corroborated the findings in this review. Lastly, the search strategy may not have captured all studies with age-disaggregated data for ALHIV.

**Conclusion**

Our review highlights the need for more research evaluating the impact of peer support interventions on treatment and psychosocial outcomes among ALHIV in sub-Saharan Africa. While there is limited high-quality evidence regarding peer support interventions for this population, the current literature suggests that peer support
interventions with individualized and group-based components may be more efficacious than group-based and individualized peer support alone. Due to methodological heterogeneity across the studies included in this review, it is not possible to draw fixed conclusions regarding the available evidence. More robust, fully powered studies are needed to strengthen our knowledge base regarding peer support for ALHIV.
CHAPTER 3: FRIENDSHIP BENCH IMPLEMENTATION DETERMINANTS

Introduction

Mental illness is a significant contributor of disease burden and mortality among adolescents worldwide (203-207). A recent meta-analysis confirms that approximately 25% of adolescents aged 10 to 19 years, globally, are at risk for clinical depression, with the highest risk occurring among adolescents from the Middle East, Africa, and Asia (203). Additionally, nearly one-third of adolescents residing in low- and middle-income countries (LMICs) are likely to have symptoms of post-traumatic stress disorder (206). Despite these estimates, there remains a severely limited pool of professional mental health providers as well as inadequate funding and policy infrastructure to support and manage mental health services in LMICs (208-211). Although nearly 90% of adolescents reside in LMICs (212), this age group lacks sufficient resources to treat and prevent risks associated with mental illness (149, 152, 204, 205, 211, 213). Without sufficient treatment, adolescents are at risk for substance abuse, inconsistent condom use, suicidal ideation, and mortality (214-217).

The burden of mental illness is of particular concern among adolescents living with HIV (ALHIV) (56, 64, 147, 152, 218). In a cross-sectional study among ALHIV aged 13 to 19 years attending five pediatric clinics in South Africa, 27% of the cohort reported symptoms of depression, anxiety, or post-traumatic stress disorder, and nearly one in four reported suicidality (149). Additionally, a meta-analysis confirms that the prevalence of depression among ALHIV aged 10 to 19 years is approximately 27%, and the prevalence among seropositive adolescents aged 15 to 19 years is nearly 10% higher (60). Similarly, in a systematic review and meta-analysis evaluating the prevalence of
psychiatric disorders in ALHIV in sub-Saharan Africa, pooled estimates for depression, anxiety, and any psychiatric disorder were between 20% and 27% (64). The authors of this meta-analysis concluded that depression is the most common mental health disorder that is associated with HIV infection as confirmed by prior studies (64). Although the link is unclear, several studies suggest an indirect association between depression and psychosocial stressors associated with HIV in adolescents such as stigma and parental loss (61, 62, 138, 149).

The intersection between psychopathology and HIV-related risk behavior in adolescents is well-documented. Adolescents with a history of psychiatric disorders or psychiatric hospitalization are more likely to engage in sexual behaviors that increase their risk for HIV (219-222). Additionally, there is strong evidence supporting the link between depressive symptoms and an increased risk for HIV medication nonadherence in adolescents in sub-Saharan Africa (146, 154), and throughout other geographical regions (223-225). Among a cohort study of 182 Tanzanian adolescents and young adults living with HIV, a quarter of the sample reported incomplete treatment adherence which was significantly associated with higher depression scores, emotional and behavioral symptoms, and trauma-related symptoms (57). Particularly among non-adherent ALHIV in Botswana, depression and suicidality were qualitatively reported as reasons for non-adherence (226). Further, a high score on a screening tool measuring behavioral and emotional difficulties was associated with an increased risk for virologic failure among seropositive adolescents from Botswana (227). These empirical findings suggest the need for robust mental health interventions to support ALHIV in LMICs.
Mental Health Interventions for Adolescents

Despite the pervasiveness of mental health disorders among adolescents throughout LMICs, there remains a shortage of mental health providers in the region (228). For example, the median number of mental health professionals available in sub-Saharan Africa is 1.6 per 100,000 population compared to a global median number of 13 per 100,000 population (229). Resultantly, task shifting of mental health services to lay health workers (LHWs) has been of growing interest in the LMIC context to address this shortage (230-233). Throughout LMICs, LHWs have delivered effective mental health interventions at a low cost following only brief training (22, 234, 235). Lay-delivered talk therapies have demonstrated efficacy even among adults affected by humanitarian crises in LMICs (236). However, there are only a few examples of efficacious lay-delivered mental health interventions for adolescents in resource-poor countries from high-quality randomized controlled trials (165, 237-240).

Although generally sparse, there is some literature supporting the efficacy of peer-delivered interventions to improve adolescent mental health in resource-limited settings. Rose-Clark et al.’s (2019) systematic review showed promising impacts of peer-facilitated interventions on adolescent mental health in LMICs. Rose-Clark and colleagues define a peer facilitator as an adolescent who delivers adolescent health programs within schools and communities (165). The authors captured seven studies reporting on mental health outcomes associated with peer-facilitated interventions for adolescents aged 10 to 19 years, and four of the seven were associated with improvements in depressive symptoms (241-243). However, none of these interventions evaluated the mental health impacts of training peers to deliver psychotherapy among adolescents despite its efficacy among adult populations in LMICs (234, 236) as well as
in high-income countries (192, 244-246). A qualitative study of a peer-led mental health intervention revealed that adolescents prefer to receive help regarding their mental health needs from peers rather than adults (247). Furthermore, a systematic review confirms that peer support interventions are more efficacious than usual care in reducing depressive symptoms (248). Another study suggests that the efficacy of peer support interventions can be boosted when the peer delivering the intervention shares the same stressor as the recipient (249).

The literature regarding mental health interventions for ALHIV in resource-poor settings also remains limited (237, 250, 251). Bhana and colleagues (2020) conducted a systematic review of mental health interventions for adolescents (aged 10 to 24 years) living with HIV or living within HIV-affected households in LMICs, which only captured three studies with interventions specifically for ALHIV. Two of these interventions were conducted in South Africa with no effects on mental health (193, 252), and the remaining intervention improved mental health outcomes among ALHIV in Thailand (253). Additionally, these three interventions assessed different adaptations of a family-based intervention focused on improving caregiver-adolescent relationships (254). According to Bhana and colleagues’ (2020) review, well-known evidence-based psychotherapies such as cognitive-behavioral therapy and problem-solving therapy are rarely applied to mental health interventions for adolescents living with or affected by HIV in LMICs. The authors found only one study involving the implementation of an intervention adapting the principles of problem-solving therapy among adolescent migrants at risk for HIV in Ethiopia, which led to a reduction in mental health problems among adolescent female participants (255). Furthermore, most interventions for ALHIV include multiple components (76, 237), making it difficult to parse out the individual effects of services
delivered by LHWs and/or peers. However, two randomized trials evaluated the efficacy of peer-delivered psychotherapies among ALHIV with some promising improvements in mental health outcomes (239, 240).

**The Friendship Bench Intervention**

Friendship Bench is an evidence-based mental health intervention primarily centered around problem-solving therapy (PST) delivered by LHWs largely within primary care settings in LMICs (124, 256, 257). PST is considered effective at reducing depression and anxiety symptoms across multiple settings and contexts, and also demonstrates efficacy in adolescent populations (258-261). Friendship Bench gained traction over the recent years due to its efficacy in improving depression symptoms among adults in Zimbabwe, a low-income country in sub-Saharan Africa (256). Friendship Bench shows promise among people living with HIV; the intervention was considered feasible and acceptable to implement among 32 Zimbabwean adults with poor antiretroviral therapy (ART) adherence and at least mild depression (262). The original Friendship Bench model was implemented by LWHs who are older adult women known as “grandmothers” (Chibanda et al., 2011). The intervention is delivered by LHWs in six sessions lasting 30 to 45 minutes each and delivered over a four to six week period (125, 263). The components of PST utilized in these sessions include problem identification and exploration, action planning, and implementation around the plan of action (124).

While Friendship Bench was originally tested for efficacy in adults living with HIV in Zimbabwe (22), there are now several iterations of the intervention in the country, including implementation among ALHIV (84, 125, 264-268). Ouansafi and colleagues’
(2021) adaptation of Friendship Bench found that the intervention delivered by
grandmothers offers an array of psychosocial benefits for ALHIV in Zimbabwe such as
mitigating HIV-related stigma, improving depressive symptoms, and encouraging ART
adherence. Another adaptation of Friendship Bench, known as Youth Friendship Bench
(or YouFB), was piloted in Zimbabwe whereby younger lay counselors aged 21 to 23
years were trained to deliver YouFB to adolescents aged 16 to 19 years (84, 267).
Clients who participated in YouFB qualitatively reported several psychosocial benefits of
the intervention such as a reduction in feelings of isolation and an increased ability to
manage life stressors (84). Wogrin and colleagues adapted Friendship Bench for use
among ALHIV in Zimbabwe (269). In Wogrin et al.’s adaptation, ALHIV aged 18 to 24
years, known as community adolescent treatment supporters (CATS), were trained to
deliver PST for their seropositive peers (269). The CATS considered themselves
uniquely poised to provide peer support due to their closeness in age and shared HIV
status amongst their clients (269).

The delivery of Friendship Bench by peer counselors was recently adapted and
piloted among ALHIV with either mild to moderate depression, anxiety, or substance use
in Gaborone, Botswana. Damschroder and colleagues (2009) conceptualized
interventions as containing core, or essential, components and an adaptable periphery
(i.e., components that can be modified) (135). Figure 3 (Appendix B) depicts the core
components of Friendship Bench as well as the components modified in Botswana.

In the original Friendship Bench model, lay counselors were supervised by
District Health Promotion Officers (DHPOs) whom the counselors contacted if clients
had critical issues that warranted professional support such as signs of suicidal ideation
(125). The DHPOs would then receive support from clinical psychologists and
psychiatrists (125). The original model also includes a separate support structure for counselors and clients. The counselor support structure includes a daily support group led by one of the lay counselors as well as group supervision by a clinician trained in PST (124, 125). The client support structure consists of a peer support group known as Circle Kubatana Tose (CKT) which means “holding hands together” (270). The peer support group allowed clients to share their experiences and engage in income-generating projects which included crocheting a shopping bag from recycled plastic materials (125, 257). In the adapted Friendship Bench model in Botswana, lay counselors were directly supervised by a clinical team of physicians and mental health professionals, and the support structure comprised post-counseling debrief and support group sessions for counselors only. In the debrief sessions, lay counselors received group support led by a mental health professional. The purpose of the debrief sessions was to help lay counselors navigate challenging cases from their counseling sessions. In the support group sessions, the counselors received psychological support through group counseling led by a psychologist and had the option to receive individual counseling if needed.

Based on stakeholder feedback (270), the adapted Friendship Bench model in Botswana was modified to include peer counselors who were adolescents and young adults. In this context, peer counselors are considered peers due to their shared HIV status and/or closeness in age with their clients. Unlike the original Friendship Bench model delivered by “grandmothers,” there are several benefits to peer delivery of Friendship Bench among ALHIV in Botswana. In Botswana, as well as in other sub-Saharan African contexts, intergenerational conversations around sex, HIV, and substance abuse are considered social taboos among elders (271, 272). There is
literature also supporting that Batswana adolescents are more receptive to receiving
guidance and information from their peers (272). Despite the benefits of peer-based
delivery of Friendship Bench among ALHIV, we lack knowledge regarding specific
factors (or determinants) that impede or facilitate the implementation of the intervention
in this context.

**Determinant Frameworks**

Determinants is a term used in implementation science to describe factors that
plausibly or empirically have an influence on implementation outcomes (273). Proctor
and colleagues conceptualize implementation outcomes that can be considered by
researchers aiming to evaluate implementation processes of evidence-based practices
(94). Some of these implementation outcomes include fidelity (i.e., the degree to which
the intervention was implemented as intended), acceptability (i.e., the degree to which
the intervention is agreeable by stakeholders), feasibility (i.e., the degree to which the
intervention can be successfully implemented), appropriateness (i.e., the degree to
which the intervention is relevant or compatible within a given context), and sustainability
(i.e., the degree to which an intervention can be maintained or institutionalized).

Determinant frameworks consist of constructs that can be used to qualitatively or
quantitatively measure facilitators and barriers that influence the implementation of an
evidence-based intervention or practice (274). One such framework that will be applied
to this investigation is Damschroder and colleagues’ Consolidated Framework for
Implementation Research (CFIR) (135). CFIR is a meta-theoretical framework with
constructs synthesized from multiple implementation theories. The framework comprises
39 constructs organized into five domains—intervention characteristics, outer setting,
inner setting, characteristics of individuals, and process. Intervention characteristics reflect key attributes of the intervention that may influence implementation success. Outer setting refers to the social, economic, political, and other external influences of implementation. Inner setting refers to characteristics of the organization implementing the intervention. Characteristics of individuals describe the individuals involved within the intervention or the process of implementation and examines their beliefs about the intervention, self-efficacy, and other attributes. Process examines the steps or procedures involved in the implementation of the intervention. The CFIR domains and constructs are mapped in Figure 4 (Appendix B); the map was adapted from the Center for Implementation (275). Damschroder and colleagues’ determinant framework is commonly used in the field of implementation science and can be applied across multiple settings and contexts. For instance, CFIR was used to study the implementation of best-practice guidelines in a low-income hospital setting in Kenya (276). Each CFIR construct with its corresponding definition is provided in Appendix D.

**Purpose of the Study**

Considering that sub-Saharan Africa is home to 90% of ALHIV (136), and their noted susceptibility to mental health disorders, it is crucial to prioritize this population and region for mental health interventions. The integration of mental health services in HIV care for adolescents is increasingly recognized as essential for effective disease management as they transition into adulthood (149). To address this need, implementation science offers guidance in the adaptation of evidence-based interventions such as Friendship Bench to improve mental health outcomes and potentially ART adherence among ALHIV in sub-Saharan Africa. Additionally, there is a
paucity of implementation research targeting ALHIV in low-resource settings, therefore prompting a global research agenda prioritizing the inclusion of this population (277-280). Understanding the implementation determinants of Friendship Bench in this context may guide further implementation among other adolescent groups across resource-poor settings. Therefore, the purpose of this study is to qualitatively describe the barriers and facilitators that influence the implementation of Friendship Bench from the perspective of peer counselors delivering the intervention to ALHIV in Gaborone, Botswana.

Methods

Study Sample and Setting

The study sample includes eight peer counselors who participated in the Friendship Bench pilot intervention study in Gaborone, Botswana from 2018 to 2019. Following Simoni et al.’s (2011) definition of peerness, the counselors were considered peers by age (i.e., adolescents and young adults) and/or their HIV status. The peer counselors were youth in between the ages of 21 and 28 (median age was 24), and all but one counselor reported living with HIV their whole life. Adolescent clients were screened for depression and anxiety symptoms during routine HIV care visits at the Botswana-Baylor Children’s Clinical Center of Excellence (BBCCCOE) in Gaborone, Botswana, and those with mild and moderate symptoms were recruited for the pilot

4In Botswana, youth are considered any person between the ages of 12 and 35 years (102).
study. The clients were able to participate if they screened positive for mild to moderate depression on the Shona Symptom Questionnaire (SSQ) or Patient Health Questionnaire-9 (PHQ-9), or screened positive for mild to moderate anxiety on the Generalized Anxiety Disorder 7 (GAD-7) scale. The age ranges of the clients were 13 to 24 years and all clients were living with HIV.

The peer counselors completed a seven-day training based on a training manual adapted from the original Friendship Bench in Zimbabwe for lay counselors. The training manual was translated into Setswana after the sections were adapted to the local context. The adaptation involved using community-based participatory inspired methods at stakeholder meetings (270). The purpose of these meetings was to understand which components of the Friendship Bench Intervention stakeholders thought should be amended so that the intervention may be successful for adolescents in the Botswana context. One of the recommendations was to recruit adolescent and young adult lay counselors for the intervention. Following the initial training, the peer counselors performed PST during mock patient scenarios to demonstrate proficiency in the delivery of problem-solving techniques. Peer counselors were only eligible to provide PST to adolescent clients once they demonstrated full competency after the training and mock patient scenarios.

**Data Source**

The data used in this paper were collected as part of a five-phase Friendship Bench pilot study to evaluate the feasibility, acceptability, safety, and preliminary efficacy of Friendship Bench among adolescents living with or at risk for HIV in Botswana. Eight peer counselors participated in semi-structured interviews in 2020 to determine their experiences with implementing Friendship Bench one year after the pilot. The semi-
structured interview guide is outlined in Appendix E. Interviews were conducted by research assistants in English mixed with some Setswana. Interviews were audio-recorded and transcribed verbatim in English by trained research assistants. Interview transcripts from the eight counselor interviews were used for qualitative analysis. The eight transcripts derived from the interviews provided rich data with an average of 23 pages and a median word count of 7,595.

**Data Analysis**

Fereday and Muir-Cochrane’s (2006) hybrid approach to qualitative thematic analysis was utilized to analyze data derived from the interview transcripts. Thematic analysis is a nonlinear process of identifying, analyzing, and reporting patterns within data (282, 283). The epistemological viewpoint typically underpinning thematic analysis is constructivism which aims to understand a phenomenon based on subjective views of the participants (282). Conventional approaches to thematic analysis involve either an inductive or deductive process of theme development (282). However, the hybrid approach is a highly iterative and reflexive process of inductively and deductively encoding data (284). Another element that distinguishes this inductive-deductive hybrid model from other approaches is its emphasis on the integration of data- and theory-driven methodologies derived from earlier pioneers in qualitative research (285, 286). Hybrid thematic analysis is ultimately an innovative qualitative descriptive approach and has been used previously to explore concepts relevant to the field of nursing (284).

Feredey and Muir-Cochrane (2006) describe five stages that involve coding data, categorizing codes, and identifying themes. These stages allow for practical application of the analytic steps underlying the hybrid approach. Coding is a process of data reduction whereby raw data are reduced to an amount necessary to answer the
research question. (287). Codes are descriptors that are developed by ascribing meaning to units of data such as words, phrases, and sentences. Before the development of themes, categories are constructed to classify coded data with similar meanings as determined by the researcher (288). A theme is “an implicit topic that organizes a group of repeating ideas” with a “high degree of generality that unifies ideas regarding the subject of inquiry” and contains “codes that have a common point of reference” (287, p. 101). In simpler terms, Braun and Clark (283) define themes as patterns within data. Categories are distinct from themes in that they are “mainly used at the beginning of the theme development process to classify findings” (287, p. 102). Themes are distinct from categories in that they capture the essence of the data within a coherent story line whereas categories are merely classifications of the data (282, 288). In the analytic process of theme development, codes are precursors of categories and categories are precursors of themes (see Figure 5 in Appendix B). NVivo (289) was used to organize transcript data and facilitate the development of codes, categories, and themes.

The five stages to the hybrid approach are visually outlined in Figure 6 (Appendix B). In Stage 1, an initial code manual, also known as a codebook, was developed by deductively generating a priori codes (i.e., generated prior to empirical review of the data) guided by CFIR to identify implementation barriers and facilitators of Friendship Bench, and creating definitions for each code. After a thorough review of the eight transcripts, an initial codebook was created with a priori and preliminary a posteriori codes (i.e., generated after a post-review of the data). In Stage 2, initial themes (or patterns) were identified by summarizing the data based on participant responses to the questions from the semi-structured interviews. During this stage, a colleague versed in
implemented science read two of the transcripts to capture initial themes which were used to refine the codebook. Lastly, member checking among the peer counselors that were interviewed was used to validate the initial themes and further refine the codebook (see Table 3 in Appendix A for finalized codebook). Member checking, also known as participant or respondent validation, is a technique used by researchers to determine the credibility of qualitative research findings (290). Initial themes with supporting anonymous quotes from the transcripts were presented to the peer counselors in a virtual group meeting where they confirmed the accuracy of the themes.

In Stage 3, the codes created were applied to the data source (i.e., the transcripts from the semi-structured interviews) using NVivo. The black arrows in Figure 6 represent the iterative processes that occurred during the analysis. Stage 3 through Stage 5 were repeated to modify existing codes and themes, respectively; modifications to codes were based on reliability testing with the same colleague who assisted with codebook validation in Stage 2.

In Feredey and Muir-Cochrane’s (2006) original framework, Stage 4 (i.e., testing the reliability of the codes) was initially Stage 2, which only allowed for testing the reliability of the a priori codes. However, the modified framework outlined in Figure 6 allowed for intercoder reliability testing to occur across a priori and a posteriori codes. To establish intercoder reliability, Stage 4 involved a second coder (i.e., the colleague previously mentioned) who coded half of the interview transcripts using the final codebook. Following O’Conner and Joffe’s (2009) suggested procedure for reliability testing, discrepancies in coding were addressed until a consensus was reached and a Cohen’s kappa statistic of 0.80 was achieved (291). In Stage 5, connecting the codes and identifying themes was carried out by using a matrix to cluster salient barriers and
facilitators by CFIR domains (see Table 4 in Appendix A for the matrix); barriers and facilitators were considered themes. The CFIR domains guided the analytical process in that it required the coders to apply the specific domain that reflected a barrier or facilitator to Friendship Bench implementation. To mitigate the cognitive burden of recalling all the CFIR constructs, we only coded for CFIR domains.

Vaismoradi and colleagues’ (2016) principles of theme development were also utilized for Stage 5. Since theme development is an intuitive process that is often difficult to articulate, Vaismoradi and colleagues (2016) offer practical considerations for theme development (287). One of these considerations include looking for abstractions in participant accounts, a process of transforming codes from concrete to more abstract meanings. Using the example provided by Vaismoradi et al. (2016), “collaboration” as a code is more abstract than the concrete code “taking responsibility of doing a task collectively.” This process is believed to enhance the rigor of thematic analysis as it requires a higher level of interpretation (287). Another principle applied to theme development is writing reflective notes, also known as audit trail (287). Audit trails map out the analytic processes undertaken by the researcher and therefore increase transparency and promote replicability in theme development. Appendix F outlines the researcher’s reflective notes which captures thoughts and reasonings throughout the analytic process.

In Stage 6, the researcher corroborated the themes by discussing each barrier and facilitator with the second coder to collectively refine themes by CFIR domain (see Appendix G for a visual depiction of our theme development process). The collective refinement of themes initially resulted in 17 determinants. The themes were later
synthesized and condensed to eight determinants based on the most salient themes per CFIR domain.

Results

After following the steps of the hybrid thematic analysis, eight determinants were identified, two of which were facilitators and six were barriers. All themes are summarized in Table 5 (Appendix A) with their relevant CFIR domains and constructs. The determinants identified for barriers were client accessibility, parental disapproval, counselor psychological wellbeing, client reticence and confidentiality concerns, and scheduling procedures. The determinants identified for facilitators were peer delivery of counseling and counselor perceived value of the intervention.

Each counselor was given a pseudonym to maintain anonymity, and all repetitive words and natural pauses were removed from the quotes taken from the peer counselor interviews to improve textual clarity. The following pseudonyms were used for the male counselors: Obonye, Tebogo, Mpho, Oratile, and Neo. The pseudonyms used for the female counselors were Lorato, Keeya, and Gorata. While it is important to note that there are more barriers than facilitators presented, the counselors suggested or have successfully used strategies to address some of the barriers.

Barriers

Client Reticence and Confidentiality Concerns

All but one of the peer counselors revealed that clients are usually reticent or reluctant to confide in them during initial sessions. According to Neo, adolescents may fear that the counselors will disclose information shared during the counseling sessions.
with the doctors at the clinic. Two counselors, Tebogo and Mpho, suggested that clients may not feel comfortable confiding in counselors whom they already know or have seen before. Tebogo said, “The first session that’s where I get problems where I have to make the client to feel comfortable when talking to you because some of these clients [they] get to see you so trying to talk to them when they had seen you before it’s a barrier... I have seen [one client] around because we live in the same neighborhood.” Similarly, Mpho stated, “In most cases it’s not every youth or everyone that’s free to talk to someone their age... so most of the time... the clients that we see here know us... Maybe it’s just the human mind... if I tell you something personal and I see you in public... automatically I will start thinking maybe you told someone or you are going to just say what I told you out and everyone hears it.”

Despite initial concerns regarding confidentiality and privacy, counselors agreed that client trust usually improves as the sessions progress: “...the first session I should think is the most difficult because this person doesn’t know whether to trust you or not because of how fast the information can travel nowadays. So, it’s a very difficult thing but as time goes, as the client [begins] to trust you, it’s fine. The problem is when you start the session” (Tebogo). Some counselors explained how they resolved this challenge by ensuring confidentiality and utilizing communication strategies to gain trust and establish rapport among their clients. For instance, Gorata stated, “The issue of them not opening up was for [me] to set up a platform where I can make them feel free that this is just me and you. [I] get them to tell [me] about themselves, what they are doing, school, what they like doing, hobbies... to make them open up... we just had to do icebreakers.” However, Oratile explained how he had difficulty engaging a client who was reticent throughout the six sessions: “I once had a client who never really said anything... [he]
wasn’t really opening up across all repeated sessions and we then ended sessions just like that, we didn’t cover much though he had a few list of things… there were like four or five problems and then some of them we didn’t go over them… So we only attended like two… we should be glad as a counselor that at least you have managed to cover other problems because maybe [there is] one problem [that] needs two sessions or three sessions.” Oratile recommended an increase from six sessions to twelve, when necessary, to accommodate clients who may take longer to open up or have problems that take longer than six sessions to address.

Among her reticent clients, Lorato would foster rapport building by saying “let’s just sit down and pretend like you and I are friends.” Although most counselors were eventually able to develop camaraderie among their clients, they also had to reinforce professional boundaries: “But most of my clients… they left here very happy. To the point in whereby even after the whole sessions were done. Even when they see me in the streets they will be like ‘Oh! Wow! I wish I could see you again, I wish we could have your contacts or something like that.’ I am not allowed to do that so I was like ‘you could just keep see[ing] me here [at the facility] or whatever’” (Lorato). Likewise, Neo said “this one client wanted my number, I was really saddened by the fact that we were not supposed to give clients our numbers because like he felt like I was sort of like a big brother and we [had a] fraternal type of like relationship or like he was always looking forward to coming in.”

Parent Disapproval

Parent disapproval of the adapted Bench may impact client participation in the intervention. Parents may not be willing to accept the intervention because they “don’t intend to understand the importance of counseling” (Keeya). Another issue is that
parents may have discordant attitudes about the intervention: “Before [the clients] come for counseling, one needs parental consent. So, the other parent will agree and the other one will not agree. So, while I want to be counseled you know it’s going to be a conflict between [the] parents now” (Keeya). According to Gorata, some parents interfere with the counseling sessions or do not allow their children to participate after the client discloses information shared during the sessions: “…the challenge that we encountered most was that parents want to know what you were talking about. You see, that was a problem. So, the big challenge was that after [the clients] told them, then it was like the parents told them don’t go there again.”

Parental nonacceptance of Friendship Bench was tied to cultural norms and societal views about counseling. Obonye highlighted beliefs about counseling held by older adults: “Since us we grew up in a society where we don’t usually share our feelings, well our parents are not those kind of people [who] believe a child can be depressed, can have anxiety, can have [these] other problems because they think they are for older people only… they don’t believe the youth can have those problems.” Neo’s comment regarding cultural views around counseling may also explain parental nonacceptance of the intervention: “when it comes to a lot of [Batswana] families there is this feeling towards psychology that’s there, you see? Where they feel like ‘Ah, I don’t want to go see a shrink’ or ‘I am too good for psychology’ or ‘psychology is only for people that [have] something wrong with them,’ you see?”

As suggested by Obonye, parental interference may also explain the reasons why clients are reluctant to confide in the counselors about serious issues such as domestic violence: “normally in our society… when a kid [is] going to see a counselor, to our parents it’s like we are going to reveal family secrets... let’s say maybe the child is
being bullied at home, is being abused and what, that process of them going to see a
counselor even the parents will be on edge that this child may expose us. So that kind of
environment will cause that child to not say anything willingly. They just avoid most of
the questions and answer them with short-ended questions to avoid revealing more
information.” Obonye tried to resolve this issue by educating the parents: “Basically we
try to talk to the parents... we tried to show them what we really do. It’s not about getting
to know their secrets. We just show them that all we want to know is to understand what
the child is going through... not what’s going on at home.”

Client Accessibility

The counselors suggested that the location of the counseling sessions was not
accessible for some clients. Oratile stated that the intervention is not accessible to
adolescents with disabilities: “we have disabled people... it’s our wish to attend [to] them
because they also need therapy sessions but [the] disabled people cannot come here
because some of them need special transport to be here.” Additionally, the location of
the counseling sessions did not seem ideal for clients who lived far away or in rural
areas. Keeya said, “even the rural areas they need counseling... the kids there they
need counseling, they deserve it also... they don’t get a chance to see something like
[Friendship Bench].” According to Oratile, “the only hiccups [the clients] have is transport
because some come as far as Mochudi, Ramotswa, Tlokweng.”

Counselors also reported that the intervention was not accessible by time as the
sessions conflicted with school hours. Keeya and Oratile suggested implementation in
school settings to address this barrier. Oratile said, “why can’t [we] go to school and
attend [to] them during lunch time or during their part time of the study time, so that then
we avoid them coming here and also going back... and when the client comes you have
to report to the parent that the child has arrived… with us going to schools it will cut the whole barrier because a parent can call saying the child has not arrived on time… if we could go to schools and meet them in schools and come back, [then] they don’t have to miss school and stuff like that or missing schools it affects them also academically.”

Scheduling Procedures

Several counselors implied that the initial procedures used to schedule clients for counseling sessions were barriers to Friendship Bench implementation. At the beginning of the pilot, when counselors were scheduling their clients by appointment only, clients were missing their scheduled appointments or attending late: “The challenge is always like coming here and also rescheduling issues… because maybe I will come here knowing my client will be here at two o’clock and then at half past two they will be telling me ‘no, I have family issues’… and then we reschedule to a different date [to] accommodate my client with me now, and I have to make sacrifices for my client because I understand it’s one of the things that we were told about. That sometimes you are going to have difficulties that you are going to invade some of the personal, private time” (Oratile). Similarly, Tebogo said “if we decided that we should meet with the client around one, then the client decides to come around two… it’s a problem because I do have other commitments outside there. So, waiting an hour for a client is a problem.”

Scheduling can also be problematic for counselors in school: “it [scheduling] was one of the most troubling things because I’m a tertiary student… because I have to like fix both of my schedules looking at what I have at school because it’s my first priority” (Oratile).

The block system appears to be a plausible solution to the scheduling issue. According to Tebogo, “they [the research team] have come up with a system of blocks where you are given four hours period to wait for a client, then the next four hours they
bring another counselor... the scheduling was okay after they introduced the blocks.”

Additionally, Obonye suggested to address the scheduling issues by working full-time to accommodate more clients throughout the week: “I think the solution that we need is basically to have [our] own space where we will be there full time to assist whoever comes whether we know him, whether we don’t know her. Just what ever help they need at a specific time they will know where to find us.”

*Lack of Financial Resources*

Several counselors emphasized the need for more transport to carry out their job responsibilities. Three counselors suggested that their current pay was not enough to afford transportation to the location of the counseling sessions, especially due to fare increases. Others also mentioned the need for money to meet their personal needs with statements like “I am not financially stable” (Tebogo) and “the money that we get is not even enough to support our own selves” (Obonye). Tebogo even expressed that he felt underpaid for his time: “I’ve invested so much in this program but the rewards are not necessarily meeting my expectations.” Gorata highlighted the need to receive pay that is commensurate with her new skillset: “My wish is for this thing to not just be a volunteer thing for us. I mean we are the first people in Botswana to having started this. And I am sure in the future we are going to have more people being a part of this, right? So, my wish is that we should not be seen just as volunteers... We may not be qualified like degree, diploma kind of qualified, but certificate yes, we have experience of a year by now. We have an experience of a year, and at some point in the future they should consider it for us it’s a job.” The lack of financial resources for transportation was also related to the issues of sporadic attendance among the clients: “money is a problem... sometimes [the clients] will just pop up out from nowhere… Imagine if I get a call like
now to come here... it’s gonna take me a long time, it’s gonna need money also. What if at that certain time I don’t have any money with me? You see that’s the kind of problem that we face” (Obonye).

*Counselor Psychological Wellbeing*

Counselors commonly reported challenges with experiencing the same hardships as their clients which can compromise their ability to provide problem-solving therapy. One counselor shared that his clients would “say something that will remind [them] of [their] own problems” (Mpho) which can “open up some old wounds [and] bring some flashbacks” (Obonye). Counselors mentioned ways in which they tried to conceal their emotions during the counseling sessions such as “I can make an excuse to go drink water” (Oratile) and “I had to pretend like I wasn’t going through what [the client] is going through” (Lorato). These emotionally triggering experiences can make it difficult for counselors to continue with the therapy sessions and may therefore prompt an unwanted referral to another counselor. For instance, Obonye said “there are scenarios where my client will be talking about [a] problem that I am basically going through right now. But when I try to refer him to another counselor, he doesn’t want that other counselor. He wants specifically to see me.” Although counselors took advantage of the intervention’s psychological support structures to manage these stressors, counselors may feel morally obligated to continue providing counseling despite the emotional burden. Neo said, “when you have cases that hit close to home, sometimes it can happen that you [are] the best person to help the client… that’s the only reason why I didn’t refer it… I try my best to still be objective [and] help the clients find solutions.”
Facilitators

Peer Delivery of Counseling

Peer counselors considered Friendship Bench a better alternative to conventional counseling led by older adults because the delivery of counseling by peers eliminates cultural barriers related to age. Oratile compared the benefits of peer-delivered counseling to the counseling he received in junior secondary school: "in junior schools [the counselors] are older and [with peer counselors] there is no language barrier because [we] are both youths so they could say whatever they need to say but then it is easy for me to understand... [if] they use street language, I can also like get the message from that rather than someone who is older." Oratile also believed that he was more relatable to his clients than his older adult counterparts: "[the clients] are younger than me but then they can open up and see he's not really that old." Two additional counselors made statements to reflect their relatability such as “even if I am old, I went to their level” (Gorata) and “we take ourselves as one as the youth [and] they see us as one and the same, people on the same level” (Obonye). Gorata stated that “[she] didn’t [act] like old ladies, like old Tswana parents [who] are very judgmental when [they] hear what [the clients] have to say.”

Counselors also emphasized that their similar age provides several advantages over counseling provided by older adults such as the ability to talk about topics relevant to adolescents such as sex, relationships, social media, and cyber bullying. Oratile said, “[peer counselors] can talk about Facebook because [they] know Facebook, [they] can talk about Instagram because [they] know Instagram [but the older psychologist] doesn’t know Instagram.” Two counselors implied that they were able to talk to their clients
about topics related to sex and relationships due to their age. Obonye stated, “we can talk for hours about literally anything [such as] relationships [and] sex lives, [as] long as it’s [just] us youth [I] don’t believe there is anything difficult to talk about.” On the other hand, Oratile implied that conversations around sex are difficult to talk about among older adults: “it’s much easier to work on all issues [and] even issues of sex... it’s easier to talk about them when I am with [the clients] because they open up… you know in our culture era we can’t talk to an elder about sex issues.” Oratile also stated his qualms about counseling provided by older adults: “when I was at junior school [I] knew that the only way I could get counseling [is] if I go to the society counseling people or I go to school [which is] totally uncomfortable for me because I will be going there with a relationship issue [and] I am not going to open up to someone older than me.”

Counselor Perceived Value of the Intervention

Counselors’ perceived value of the intervention may determine how motivated they are to implement problem-solving therapy within Friendship Bench. Peer counselors were committed and personally invested in the implementation of the adapted Bench because they acknowledge the positive impact that the intervention has on their clients and among themselves. For instance, Mpho stated “the best part is [that] we can see the difference between how you communicate with the client... you see that they are now free... like you are really doing something to help someone.” Similarly, Lorato mentioned that she noticed “a different version” of her clients after the sessions and believes she “can actually help somebody” because the clients are learning how to solve their own problems as a result of the therapy. Tebogo discussed the benefits of providing counseling among his peers: “it was very exciting to work with young people such as me
because it also shows me that all those challenges I go through, it’s not only me. There is someone going through them and it’s also exciting because I get to help my peers.”

Despite concerns regarding low compensation, the interviews suggest that counselors perceive their participation in Friendship Bench as invaluable. Tebogo implied that his commitment to the Bench supersedes his desire for more compensation. He stated “I would still be here because I do believe in the program but [I] would hope in the long run things will change... I’ve invested a lot of time here and [that] time I could be using it to look for ways to be financially stable.” Tebogo also revealed that his compensation did not impact his participation or performance within the Bench: “I will not say [my pay] has derailed me from doing what I am doing here... it’s a personal choice to come here so... I should think it did not derail me.”

Counselors are also invested in Friendship Bench implementation due to its impact on their personal lives. For instance, Lorato stated that she was able to use the relaxation exercises she learned during the training, which were “things to say to clients when they are crying,” to help her with her own “emotions and [to] be at peace with everything.” Counselors were able to apply the skills they have learned in training to provide psychological support to their family and friends dealing with difficult situations such as suicidal ideation and family members with life-threatening illnesses. Gorata had “a friend who at one point tried to commit suicide” and was able to identify the “red flags” because she learned about them during the training. Neo mentioned that his family and friends “offload their issues unto [him and] they know that what they tell [him] is secured and it will never be leaked out.” Friendship Bench implementation provided the counselors with improved self-efficacy to manage their personal issues. Oratile stated that the intervention “raised [him] to become more responsible” when making decisions.
Lorato stated how her participation in the Bench improved her self-confidence: “I used to lack confidence [and] it led to the point whereby even at home I was not open in certain things, I would just keep things to myself… Now I can open up to my family. I am still on that process but it’s a confidence booster for me.” Tebogo even believed that the intervention made him a better person because he learned healthier ways to manage stress.

Discussion

Our eight implementation determinants provide four key implications for future implementations of Friendship Bench and perhaps other lay-delivered psychological interventions targeting adolescents. First, our determinants provide a preliminary step to further understanding the potential outcomes of Friendship Bench implementation when delivered among adolescents in resource-poor settings. Second, our determinants highlight the advantages and disadvantages of utilizing peers to successfully deliver psychotherapy. Third, our determinants underscore specific considerations for successful implementation of any psychotherapy delivered by lay providers. Lastly, our findings highlight the utility and limitations of the CFIR framework for identifying implementation determinants.

Our findings highlight potential advantages of utilizing peers to deliver psychotherapy. In the context of relative advantage, shared experiences and similar age make peer counselors more relatable among their clients than adult counselors. These advantages were corroborated in similar iterations of Friendship Bench adapted for adolescents (84, 269). With regard to implementation outcomes, the literature suggests that peers are regarded as acceptable providers of psychotherapy in LMICs due to
mutual experience (292). Similarly, a systematic review of peer implementation of mental health services in high-income countries confirm that peer workers are viewed as more advantageous than nonpeer staff due to relatability (99). Our findings also indicate that peer counselors are more appropriate than adult counselors when engaging in discussions around sensitive topics with adolescent clients. In the Botswana context, our research is consistent with other research suggesting adolescents would prefer to talk to their same- or similar-aged peers, rather than older adults, about sex and other sensitive topics (99, 271, 272). Supporting out findings, Ahmed et al.’s study revealed that adult-aged lay health workers, known as expert clients, in Eswatini believed that they were not ideal candidates for discussions around sex with their adolescent clients due to their age (40). However, some adolescents may remain hesitant to engage in these discussions even amongst their adolescent peers. Wallén and colleagues found that adolescent clients participating in Friendship Bench in Zimbabwe were uncomfortable with discussing sex and relationships with peer counselors, and the counselors also felt inadequately prepared to address such topics (267).

Our findings also point to potential disadvantages of using peers to deliver psychotherapy. As found in our study, client confidentiality concerns related to working with counselors who live in their community was a common issue highlighted in other studies evaluating lay-delivered psychological interventions (99, 293). Wogrin and colleagues reveal that ALHIV who were clients within Friendship Bench had initial concerns around status disclosure even though their peer counselors shared their HIV status (269). As noted in similar studies (84, 293), we found that ensuring confidentiality can mitigate these concerns and that trust develops overtime. We also found that peer counselors and their clients have conflicting schedules such as school commitments...
which limits availability for counseling sessions. Contrary to Thoits’ findings regarding peer support (249), peer counseling for adolescents in Friendship Bench may not be ideal when counselors share similar stressors as their clients. As found in other peer-delivered versions of Friendship Bench for adolescents (267, 269), our study indicates that peer counseling may involve shared trauma. While shared experiences can be an advantage in some contexts, shared trauma may negatively impact counseling delivery and client-counselor relationship dynamics. Shared trauma can put counselors at risk for post-traumatic stress and may also increase self-disclosure and compromise professional boundary-setting (99, 294). Similar to our findings, Wogrin et al.’s Friendship Bench pilot revealed that peer counselors may feel obligated to take on the psychological burden of managing clients with complex needs (269). These factors may hinder successful peer counseling and lead to burnout and compassion fatigue.

Our findings also provide implications regarding potential implementation outcomes of lay-delivered psychological interventions. According to Proctor and colleagues, recipient penetration is an implementation outcome that refers to the extent to which eligible individuals use a particular service (94). As identified in prior research (295, 296), our findings suggest that outer setting barriers such as limited accessibility among adolescents with disabilities or within rural communities may impact service penetration. Other outer setting barriers such as stigma around mental health treatment has been confirmed in the literature as a continual challenge to mental health service penetration among adolescents both in LMICs and high-income countries (295, 297-299). In the context of the inner setting, our study highlights the importance of sufficient financial resources to promote sustainability as an implementation outcome. Lay health workers often have concerns regarding low compensation which may impact motivation
to maintain the intervention (41, 300). Similar research evaluating lay-delivered psychological interventions suggest that counselor motivations are important indicators of successful delivery and sustainability (292, 293). We also found that lay counselors are motivated by personal gain which is evident in similar studies (292). Corroborating our findings, lay counselors of Friendship Bench and other psychological interventions often report counseling as a rewarding experience leading to personal growth such as improved self-confidence and altruism, and improved efficacy in managing their own problems (267, 293). Counselor motivation may also improve implementation fidelity as motivated counselors are intentional about delivering the intervention as intended (292).

Our study indicated that parental influences are important factors to consider when implementing psychological interventions for adolescents. Parents are often the gatekeepers of mental health service utilization among adolescents across high-income countries and LMICs. Parental perceptions and stigmatization of counseling were identified as driving barriers to mental health service use among minority adolescents in the United States (301). As suggested by Neo in our study, MacCann and colleagues indicate that some sub-Saharan African parents view mental health counseling as stigmatizing and were raised to believe that mental health professionals are “shrinks” (302). In Wogrin et al.’s Friendship Bench model for ALHIV, peer counselors also faced resistance from caregivers, but found that pre-engagement activities helped to earn their approval (269). Our findings regarding parental disapproval also demonstrate the need to address policies that may hinder access to mental health services among adolescents in Botswana. According to Botswana’s primary mental health legislation, individuals under 16 years of age cannot apply for voluntary inpatient treatment without parental consent (303). Additionally, Botswana’s mental health laws offer limited protections for
persons with mental disorders (303), which may further exacerbate access to psychological interventions among adolescents. Therefore, implementation strategies are needed to garner parental approval of adolescent engagement in psychological interventions and there remains a need for robust policy infrastructure to further support adolescents with mental health needs.

The barriers we identified may be addressed by the development of implementation strategies. As indicated by our results, there were several strategies utilized by the peer counselors to address the implementation barriers they encountered. For instance, the block system was designed to address scheduling challenges by enabling the counselors to choose a four-hour period in which they were available to see clients. This strategy alleviated the burden of waiting for clients who miss their appointments. The next steps may be to test the efficacy of these strategies in future research. For instance, Tebogo recommended educating parents about counseling to remove myths or biases associated with the provision of counseling among their children. This recommendation can be mapped to one of the implementation strategies derived from the Expert Recommendations for Implementing Change (ERIC) project, a compilation of input from a wide array of stakeholders with expertise in implementation science and clinical practice (304). Conducting educational meetings, an implementation strategy derived from the ERIC project, may be appropriate to address the barrier of parental disapproval.

Our findings also highlight the utility of the CFIR framework for identifying pertinent factors involved in Friendship Bench implementation tailored for ALHIV. Drawing from the CFIR constructs, we provide the first steps for understanding factors that facilitate or impede a sustainable lay-delivered psychological intervention for
adolescents. While our study findings corroborate the utility of using CFIR to capture implementation determinants, there remains gaps regarding its applicability across LMICs. After a systematic literature review of the application and utility of CFIR in LMICs, Means and colleagues proposed new CFIR constructs to consider in the LMIC context (305). One of the constructs proposed was community characteristics, a determinant which considers the sociocultural and religious context of the consumers of the intervention. As implicated by our research, cultural norms and views regarding counseling are essential determinants of successful Friendship Bench implementation.

Additionally, Means and colleagues proposed a new domain, characteristics of systems, to capture factors within healthcare systems that may impact inner setting and outer setting constructs. For instance, resource source, a construct identified under the characteristics of systems domain, considers resources for entire healthcare systems such as domestic government resources, bilateral developmental aid, and private foundation support (305). As suggested by our study, the lack of financial resources is a concern across several interventions implemented in LMICs, thereby warranting deeper consideration to resource source as a potential determinant of Friendship Bench implementation.

Regarding the strengths of our study, our work contributes to the advancement of implementation science research to improve adolescent mental health disparities in LMICs. Additionally, two individuals were involved in coding the data to promote reliability and rigor in theme development. Member checking of initial themes was utilized to ensure that the counselors’ perspectives were not misrepresented. Regarding our limitations, our determinants were derived from the perspectives of peer counselors only. Client and parental views regarding the adapted Friendship Bench are warranted to
corroborate the findings from this study. Interviewing parents may provide additional insights into ways in which the intervention can be further modified to promote acceptability and penetration. Feedback from clients may confirm the relative advantage of the adapted Friendship Bench or whether the original model delivered by older adults is preferred under specific circumstances. Furthermore, several outer setting and inner setting constructs from CFIR such as organizational and external policies may be beyond the knowledge or capacity of the counselors to address. Therefore, perspectives from other stakeholders such as government and organizational leaders can be considered in future research.

Due to the nature of our data analysis method, we did not capture other elements of Friendship Bench implementation such as training and supervision since such topics did not emerge thematically from the transcripts. Since we relied on secondary qualitative data, we were limited to only eight transcripts and therefore could not determine data saturation, or completeness, of ideas represented in the data. However, our themes do provide some evidence of saturation through the redundancy of ideas represented by each counselor across the themes and based on similar themes found in other studies evaluating Friendship Bench implementation for adolescents (84, 267, 269). Additional pilots of Friendship Bench tailored for adolescents are needed to confirm the completeness of the inductive and deductive codes and themes represented in our paper. Furthermore, there is current research in progress to evaluate determinants and develop implementation strategies to optimize Friendship Bench implementation (306).
Conclusion

We provide eight determinants which may facilitate or hinder successful implementation of a brief, peer-delivered psychological intervention tailored for ALHIV. Overall, our research can guide future implementation research evaluating the determinants of peer-delivered, evidence-based psychotherapies for adolescents across resource-poor settings. Our research aligns with current efforts to leverage implementation science research to address adolescent mental health disparities particularly in LMICs. The results from our study also confirm CFIR as a useful tool for analyzing implementation determinants. However, there is a need to expand the CFIR constructs to consider other important factors such as culture. Future research is needed to corroborate our findings through parent and client perspectives and to develop and test implementation strategies to address the barriers identified in our study. Lastly, our determinants provide important implications regarding the potential implementation outcomes of the Friendship Bench adaptation. Additional implementation research is needed to promote acceptability, client penetration, and sustainability of the intervention.
CHAPTER 4: IDENTIFYING ADHERENCE BARRIERS AND DESIGNING PROTOTYPES

Introduction

Although the universal availability of life-saving antiretroviral therapy (ART) has made it possible for adolescents living with HIV (ALHIV) to survive into adulthood, AIDS remains one of the leading causes of death among this population in sub-Saharan Africa (136, 137). ART is a highly efficacious treatment that prevents HIV-related morbidity, AIDS progression, and HIV transmission by sustaining viral suppression in people living with HIV (70-73). Although adherence levels of at least 80% are required for ART to be effective (307-309), only 62% of adolescents reach sufficient adherence thresholds for ART globally (130).

There are several studies confirming that adolescents have insufficient ART adherence and suboptimal rates of viral suppression throughout sub-Saharan Africa, especially when compared to that of adults (55, 66, 68, 69, 138, 139). For instance, viral suppression among adolescents receiving ART in Cameroon was only 53.3% compared to 81.1% in adults (68), which is suggestive of insufficient adherence levels. In a seminal observational cohort study comparing virological outcomes among adolescents and adults in southern Africa, adolescents achieving viral suppression were significantly more likely to experience viral rebound compared to adults (66). In the same study, adolescents were found to be significantly less likely to achieve 100% ART adherence than adults. In a cross-sectional study conducted in Malawi, nearly half of all ALHIV reported non-adherence to ART in the past month (138).
The developmental changes faced during the adolescent years compound the challenges of chronically managing HIV, thus making the adolescent population particularly vulnerable to non-retention in HIV care and treatment failure. Additionally, ALHIV in sub-Saharan Africa undergo a myriad of psychosocial stressors that exacerbate their ability to achieve optimal ART adherence levels, including stigma, abuse, poverty, orphanhood, and depression (40, 54, 138, 310). According to a systematic review, the main barriers to ART adherence among ALHIV in sub-Saharan Africa are stigma, ART side-effects, lack of assistance, and forgetfulness (54).

Adolescents in sub-Saharan are also more likely to delay ART initiation compared to their adult counterparts (311). Considering that sub-Saharan Africa accounts for nearly 90% of the global population of ALHIV (3), there is a need for innovative interventions to improve ART adherence rates among adolescents within this region.

**The Role and Impact of Expert Clients**

Peer lay health workers (PLHWs) are largely recognized for promoting positive health behaviors and increasing access to health services (79). Expert clients, also known as expert patients, are PLHWs utilized throughout sub-Saharan Africa to deliver peer support services to people living with HIV such as adherence counseling and monitoring, linkage to HIV care services, and health education (21, 39, 41, 312, 313). According to Dennis’ (2003) conceptualization of peer support (79), expert clients are considered peer supporters to ALHIV by virtue of their shared HIV status and health-promoting job responsibilities. Expert client service delivery is considered a peer-based model of care for people living with HIV, and expert client programs are often credited for the following treatment successes: reducing service provider workload, improving retention of patients in care, and increasing uptake of HIV services (129).
There is some literature measuring the impact of expert clients indirectly through the evaluation of HIV treatment interventions that were fully or partially implemented by expert clients. In a single clinic in Malawi, expert patients performed 368 hours of nurse-related tasks each month, which is equivalent to the full-time work of nearly three nurses per month (314). In a study evaluating linkage to care after home-based HIV testing and counseling, newly diagnosed people living with HIV were 4.9 times more likely to be linked to care within seven days of diagnosis when expert clients were involved in the linkage process (312). In Eswatini, task shifting from nurses to expert clients contributed to an increase in patient ART initiation from 64% to 91% between 2010 and 2012 (39). In an observational cohort study examining early ART enrollment through a linkage case management program led by expert clients in Tanzania, 91% of patients enrolled in the program achieved early ART initiation (315). In a study evaluating the same case management program in Eswatini, expert clients were able to resolve 65% of barriers to ART enrollment or retention in HIV care (i.e., stigmatization, non-disclosure of HIV status, ART side effects); 96% of patients who had all or nearly all barriers resolved by expert clients had initiated ART and returned for at least one antiretroviral refill (316).

Prior research done by the investigator in 2017 demonstrated that expert clients in Eswatini play a vital role in promoting optimal ART adherence among ALHIV (40, 41). The purpose of the study was to explore expert client service provision among ALHIV Eswatini (40, 41). The study revealed that expert clients assist these adolescents with navigating a variety of challenges that affect ART adherence such as HIV non-disclosure and lack of caregiver support (40). In Eswatini, expert clients work within “Teen Clubs” to provide educational sessions pertinent to HIV management such as disclosure, safe sexual practices, and ART education (40, 41). Teen Club is a multi-component support
group program for ALHIV usually between the ages of 10 and 19 and have been associated with improved retention in care (177). Despite these interventions undertaken by expert clients, 23.6% of Swazi adolescents on ART remain virally unsuppressed compared to only 6.7% of their adult counterparts (126). However, a behavioral economics (BE) lens may provide a novel approach to understanding and improving ART adherence behavior among ALHIV in Eswatini.

**The NUDGE Framework**

The NUDGE (Narrow, Understand, Discover, Generate, and Evaluate) framework is a novel behavioral design approach informed by BE and design thinking (317, 318). Design thinking, is a human-centered approached increasingly utilized in a global health context to develop novel solutions to health and social issues (319, 320). NUDGE has its foundations in Datta and Mullainathan’s (321) behavioral design approach which was utilized in previous work to evaluate behavioral barriers to modern methods of contraception among unmarried adolescents in eastern Senegal. The overall goal of NUDGE is to systematically apply insights from BE (i.e., behavioral insights) to design intervention prototypes to influence or “nudge” decision-making around a desired target behavior (322-324). NUDGE is comprised of five steps: 1) **Narrow** the focus to a specific target behavior, 2) **Understand** the context of the behavior through inquiry, 3) **Discover** behavioral insights related to the target behavior, 4) **Generate** intervention design features to address behavioral barriers to the target behavior, and 5) **Evaluate** the design features through iterative pilot testing (322-324).

Within the context of the NUDGE approach, behavioral barriers are “factors arising from cognitive or psychological processes that reduce the likelihood of a target
behavior being carried out” (324). Behavioral barriers are identified by applying cognitive biases and heuristics derived from the behavioral science and psychology literature which then provides the foundation for the development of behaviorally informed intervention prototypes (322). Brewer and colleagues (2020) used the NUDGE framework to explore behavioral barriers to micronutrient powder (MNP) use among caregivers for preventing childhood anemia in Arequipa, Peru. The authors used the Discover step to hypothesize that the negative experiences associated with MNP use (e.g., undesirable side effects) outweighed their positive experiences with MNP. As proposed by the authors, the BE construct underlying this barrier is negativity bias, which refers to our tendency to recall and emphasize negative events more than positive events of the same magnitude (325). Although the authors only carried out the Discover step, the behavioral barriers identified in their study provide the context needed to design BE-informed interventions.

The NUDGE framework can be applied to systematically design intervention prototypes that are informed by behavioral insights. Stewart and colleagues (2021) applied the Discover step of NUDGE to identify, synthesize, and validate hypothesized behavioral barriers to evidence-based practice (EBP) utilization among mental health clinicians. One hypothesized barrier made by the authors was that EBPs are considered difficult to implement by clinicians, which was based on contextual inquiry data collected in the Understand step. According to the authors’ hypotheses, the behavioral insight underpinning this barrier is choice overload, a cognitive process whereby people have difficulty making decisions when there are too many options presented to them. Developing “one-pagers” to simplify EBP delivery was a design feature suggested by the authors to address this barrier. Similarly, Last and colleagues (2021) utilized the
Discover and Generate steps to discover behavioral barriers to the use of trauma narrative (i.e., a component of trauma-focused cognitive behavioral therapy) among clinicians, and subsequently generate implementation strategies that targeted those barriers.

**Problem Statement and Research Aims**

Jobanputra and colleagues confirm that Swazi adolescents are significantly less likely to be virally suppressed compared to Swazi adults (69). Like their sub-Saharan African peers, Swazi adolescents are vulnerable to gender-based violence, emotional abuse, as well as other traumatic events that may compound their risk for suboptimal treatment adherence (40, 326-328). Furthermore, MacKaellar and colleagues (316) identified that a higher proportion of Swazi adolescents aged 15 to 24 years have more than three barriers to HIV care compared to Swazi adults over the age of 35; some of those barriers involved stigmatization, perceived wellness, and denial.

BE offers meaningful insights pertaining to patterns of human behavior that may uncover unanswered questions regarding the barriers to optimal treatment adherence among ALHIV in Eswatini. Despite literature highlighting several barriers and facilitators of ART adherence among ALHIV in sub-Saharan Africa (54), there has been limited research done to explore barriers utilizing a behavioral design approach. Innovative design approaches are rarely used to mitigate ongoing ART adherence challenges faced by ALHIV in resource-limited settings. Despite theoretical and empirical support confirming the utility of peers in influencing health behavior change (79, 329), the idea of utilizing expert clients to “nudge” ART adherence has been minimally explored. Expert clients have first-hand knowledge regarding the behavioral barriers experienced by
ALHIV since they work directly with this population to provide ART adherence support (40). However, we lack a deeper understanding of the behavioral barriers they witness among their adolescent clients. Therefore, the aims of this study are to 1) use the Discover step of the NUDGE framework to guide the identification of behavioral barriers to ART adherence among ALHIV in Eswatini as informed by previously collected contextual inquiry data, and 2) use the Generate step to design behaviorally informed intervention prototypes that can be used by expert clients to address the identified barriers.

To accomplish the research aims, this study will present the results from the Discover and Generate steps of NUDGE. The first two steps, Narrow and Understand, are based on Ahmed et al.’s (40) previous study whereby navigating poor ART adherence was considered one of the main challenges faced by expert clients when providing peer support services to ALHIV in Eswatini. Therefore, the target behavior is ART adherence among Swazi ALHIV (the Narrow step), and expert client interview transcripts from Ahmed et al.’s (40) study provide the relevant context needed to understand barriers to the target behavior (the Understand step). Behavioral barriers to ART adherence among ALHIV will be identified in the Discover step (i.e., Aim 1) and intervention prototypes for expert clients will be designed in the Generate step (i.e., Aim 2) with the overall goal of providing expert clients with strategies for “nudging” ART adherence among ALHIV. The Evaluate step will be completed in future work.

Methods

The study sample includes 20 expert clients who participated in Ahmed and colleagues’ (40, 41) qualitative study. The expert clients were interviewed to examine
their experiences working with ALHIV within Teen Clubs. Expert clients were recruited from peri-urban, urban, and rural regions of Eswatini—Hhohho, Manzini, and Lubombo, respectively. The age of the expert clients ranged from age 22 to 43, and most of them were female (80%). Between April 2017 and May 2017, expert clients were recruited by chain referral to participate in semi-structured interviews. Using an interview guide (see Appendix H), expert clients were asked a series of open-ended questions to query their perspectives regarding expert client service delivery practices for ALHIV, including the challenges faced by expert clients while working with this population. All expert client interviews were audio-recorded and transcribed verbatim. Interviews conducted in siSwati were translated to English by Swazi data clerks. The interview transcripts provide the contextual data needed to accomplish the Discover step.

**Analytic Approach**

The Discover and Generate steps of the NUDGE framework constitute the analytic approach undertaken to accomplish the study aims. The Discover step was completed in three sub-steps which comprise using BE principles to identify behavioral barriers to ART adherence and rapidly validating the barriers via stakeholder feedback. In the context of this investigation, the stakeholders were the expert clients. In the Generate step, the validated list of hypothesized behavioral barriers formulated in the Discover step were used to inform the design of BE-informed intervention prototypes. Replicating the approach used by Last and colleagues (330), the EAST (Easy, Attractive, Social, and Timely) framework was used to guide prototype development. The process of the Discover and Generate steps are further described below.
Discover Sub-Step 1

The first sub-step of Discover was completed by brainstorming hypotheses about behavioral barriers within a three-member multidisciplinary team versed in the NUDGE process as well as the biases and heuristics relevant to BE. After a thorough review of the contextual inquiry data (i.e., expert client interview transcripts), we independently brainstormed a list of hypothesized barriers regarding the target behavior. To guide the brainstorming process, we used a list of behavioral prompts which consider the cues, alternatives, and meanings associated with decision and action steps pertaining to the target behavior (see Table 6 in Appendix A for a list of behavioral prompts). In the context of this investigation, the decision step refers to one’s intention to adhere to ART. The action step refers the actual behavior of adhering to ART. An example of how the behavioral prompts apply to cues, alternatives, and meanings of action and decision steps are outlined in Figure 7 (Appendix B).

As the name implies, the overall goal of the Discover step is to “discover” behavioral barriers by connecting raw ideas to insights from BE, a process known as “behavioral mapping” (317). During the brainstorming process, we used the Cognitive Bias Codex to link BE constructs to raw ideas from the contextual inquiry data. The Cognitive Bias Codex comprises a list of cognitive biases and heuristics relevant to BE (331). In addition to using the codex, we used our prior knowledge of BE principles to brainstorm hypothesized barriers regarding the target behavior. The process of this step yielded a total of 122 barriers to ART adherence (see Figure 8 in Appendix B for NUDGE process and results).
Discover Sub-Step 2

The second sub-step of the Discover process involved deduplicating and synthesizing our 122 hypothesized barriers generated from the previous sub-step. An Excel spreadsheet was used to synthesize, deduplicate, and finalize our hypothesized barriers. We removed 82 duplicate hypotheses and subsequently refined and synthesized the remaining barriers which yielded a total of 22 distinct barriers (see Appendix I for de-duplicated barriers). The deduplicated list of hypothesized barriers were discussed collaboratively to resolve any disagreements pertaining to the relevance of each hypothesis and the relevance of the behavioral bias or heuristic underlying the hypothesis. For example, when a person disagreed with one of the hypotheses made, the group discussed the reasons for the disagreement and decided to keep, remove, or modify the hypothesis based on group consensus.

Discover Sub-Step 3

The last sub-step of the Discover process involved rapidly validating the identified barriers. The final list of hypothesized barriers developed in the previous step were iteratively validated with expert consultation. We consulted with expert clients to further validate the hypothesized barriers. In two expert consultation meetings (“focus groups” hereafter), expert clients met in groups of six to seven to review and make modifications to the deduplicated barriers developed in the previous sub-step. The group size and number of expert clients within each focus group was informed by literature regarding the appropriate sample size for focus groups (332). The first focus group comprised six adult expert clients between the ages of 28 and 43 years. The second focus group included seven younger expert clients, also known as community adolescent treatment supporters (CATS), between the ages of 21 and 25 years.
Before the focus groups convened, three expert clients, referred to as expert client leaders (ECLs), further refined and narrowed our 22 synthesized barriers to 13 by ranking the most relevant barriers from 1 (strongly disagree) to 5 (strongly agree). The ECLs, aged 26 to 28 years, served as gatekeepers responsible for recruiting their colleagues for further validation of our list of hypothesized barriers. The ECLs have several years of experience working as expert clients for ALHIV and are considered advocates for this population on a community and policy level. The ECLs also facilitated the focus group meetings. All expert clients who participated in the validation process were not the same expert clients from Ahmed et al.’s (40, 41) original study.

During the focus group discussions, expert clients were asked close-ended and opened-ended questions about the hypothesized barriers. The expert clients were provided with the list of 13 hypothesized barriers refined by the ECLs and the following questions were asked regarding each barrier: Do you think that this statement is accurate? Yes, or no? If yes, why? If no, why? Respondents were also prompted to give examples of adolescent behaviors around ART adherence that they have observed personally in their work as expert clients, which was used to further modify and refine the list of 13 hypothesized barriers. The ECLs collated the feedback from both focus groups which they used to select and prioritize five barriers deemed as most relevant from the list of 13 barriers. To further validate the five barriers they prioritized, the ECLs returned them to the expert clients who participated in the two focus group meetings.

**Generate Step**

The five prioritized barriers from the Discover step were used to inform the design of intervention prototypes in the Generate step. We used the EAST (Easy, Attractive, Social, Timely) framework to guide the design of intervention prototypes. The
EAST framework was developed by the Behavioral Insights Team, also known as The Nudge Unit, a behavioral science team in the United Kingdom that applies behavioral insights to inform policy and improve the delivery of public services (333). We independently brainstormed intervention prototypes that were informed by the behavioral insights gleaned from the Discover step. The Behavioral Insights Team created EAST cards which contain practical examples of applying behavioral insights to each principle of the framework to inform intervention design: Make it Easy, Make it Attractive, Make it Social, Make it Timely. Each of the four principles are informed by the BE literature. Examples of how to apply the EAST framework (as prompted by the EAST cards) are provided in Table 7 (Appendix A). After we generated our prototype ideas, we engaged in several iterations of meetings with the ECLs and the other expert clients who participated in the validation process of Discover. The expert clients vetted our ideas and provided their perceptions regarding the utility of each prototype design. We then used the expert clients’ feedback to refine our prototype ideas.

Results

Discover Step Results

During the validation process, the expert clients concurred with five behavioral barriers to ART adherence among ALHIV which are outlined in Table 8 (Appendix A). On average, the expert clients and ECLs had 5 years of experience providing peer support to ALHIV. Additionally, the behavioral constructs do not represent the results; the constructs only provide behavioral insights into the hypothesized barriers which represent intentions, or decision-making steps, regarding the target behavior. The
underlying BE constructs associated with each behavioral barrier is italicized throughout this section and defined in Table 9 (see Appendix A).

**Barrier # 1: Adolescents may avoid taking ART medication due to anger, shame, or lack of acceptance related to dishonesty and delayed disclosure among parents.**

As supported by the validation process, the contextual inquiry data revealed that adolescents may avoid adhering to ART regimens due to dishonesty and delayed HIV disclosure by their parents. In Eswatini, it is not uncommon for ALHIV to have acquired the infection around birth. In such cases, some parents and caregivers may avoid disclosure by lying about the indication of the medications. Parents may tell their child that the ART medications are being used to treat conditions that hold less stigma such as tuberculosis. When parents delay disclosure of their HIV status, this may result in anger and distrust among adolescents and therefore prompt resistance to ART use. The adolescents’ anger and distrust may spur reactive devaluation whereby they devalue instructions regarding medication adherence from their parents due to negative views pertaining to parental dishonesty.

Feelings of shame and anger ensued by delayed disclosure may also reflect an underlying affect heuristic, a cognitive shortcut that can lead to impulsive decision-making. Experiences of anger and perceived betrayal may lead to an emotional decision to not take ART during these emotional states. Lastly, delayed parent disclosure may precipitate avoidance of ART due to lack of acceptance among adolescents, reflecting the ostrich effect or the act of avoiding negative feedback or information. The validation process confirms that some adolescents struggle with accepting their HIV status and may feel the need to bear the brunt of daily treatment taking for a condition that was acquired outside of their control. Therefore, medication nonadherence may also be
explained by adolescents seeking to avoid the negative emotions associated with their HIV status.

**Barrier # 2: Adolescents who are living in poverty lack food and clothing which can interfere with their ART adherence because they are focused on meeting their immediate needs.**

During the validation process, the expert clients agreed that poverty and food insecurity interfere with ART adherence. The behavioral insight potentially underpinning this barrier is the *psychology of scarcity* such that food scarcity leads to trade-off thinking. Adolescents with competing needs may lead to a myopic viewpoint centered on meeting basic needs such as food and clothing at the expense of deferring other critical needs to sustain their health such as medical appointments and treatment adherence. Adolescents also experience scarcity in the context of social support. Our contextual inquiry data and validation steps also suggest that scarcity is a prominent concern especially within child-headed households where adolescents must provide for themselves and have no one to remind them to take their medications. Adolescents often become the head of their household due to HIV-related orphanhood. The validation steps confirm that while adolescents may have grandparents as guardians, the grandparents are often unable to provide financial support. The contextual inquiry data and validation process confirm that instances of scarcity are exacerbated by lack of social support from caregivers in the household. Although adolescents may have the right intentions to adhere, their attentions may be divided as they establish means to survive in the setting of significant socioeconomic constraints and hardship.
Barrier # 3: Adolescents may not want to take ART out of fear of undesirable side effects.

Intentions to adhere to ART can be influenced by mental models, or deeply rooted ideas and viewpoints. According to our contextual inquiry data, expert clients suggested that adolescents are apprehensive about taking their antiretroviral medications “on an empty stomach,” but did not provide answers to the reasons underlying that fear. However, our validation steps revealed that the issue of scarcity, as highlighted in Barrier # 2, illuminates the underlying fear of taking medications without food. Expert clients confirmed that adolescents who lack food may not take ART to avoid undesirable side effects associated with older regimens. Therefore, we hypothesized that adolescents may have an underlying hot-cold empathy gap in that their visceral or “hot” reactions to the medication (i.e., side effects) may alter their intentions to adhere to ART. Adolescent fears regarding medication taking without food may also reflect a mental model about medication consumption in which they believe that all medications must be taken with food to avoid undesirable side effects. Hesitancy to take new ART regimens can be linked to negative experiences with previous antiretroviral regimens with undesirable side effects, therefore suggesting negativity bias such that adolescents are more attentive to their negative experiences on ART which may undermine their positive experiences with the treatment.

Barrier # 4: Adolescents fear public and interpersonal disclosure of their HIV status.

The contextual inquiry data indicate that adolescents fear being judged by others if seen consuming ART medications in public or while picking up ART at a treatment facility. These fears may reflect the spotlight effect whereby adolescents overestimate the amount of attention placed on them by others. Our validation steps confirm that
adolescents are afraid of publicizing their HIV status, even amongst their seropositive peers. According to our contextual inquiry data, one expert client stated that some adolescents may even oppose attending peer support groups for ALHIV (i.e., Teen Club) because “they do not want their HIV status made public.” The contextual inquiry data also revealed that adolescents may have difficulties with taking their medication in the presence of their peers at school. Lastly, we found that some facilities arrange ART refills for adolescents on weekends, such as Saturdays during Teen Club, to promote discretion around their HIV status.

Our contextual inquiry and validation steps suggest that internalized stigma may be driving the spotlight effect. Validation meetings among expert clients reveal that there are deeply embedded social stigmas around HIV that may be internalized by seropositive adolescents. Disparaging terms associated with HIV such as “ingculazi” reflect negative stereotypes which can make adolescents fear rejection and discrimination by peers or romantic partners. Stereotypes can be rooted within a representativeness heuristic, a cognitive shortcut that can be used to guide assumptions about people living with HIV. Adolescents may rely on representativeness heuristics concerning HIV as evidenced by their stereotypical views. According to the contextual inquiry data, adolescents assume that “an HIV-positive person has scars” and may not picture a seropositive person with their “hair combed, nicely dressed or made up.”

Ingculazi is a siSwati term which means a deadly disease that is easily noticeable on one’s body without the person disclosing the condition.
Barrier # 5: When adolescents reach puberty, they begin to rebel and refuse taking ART against the advice of adults.

Expert clients reported that as adolescents reach puberty, they tend to disregard medical advice pertaining to ART adherence and begin to question the treatment as they seek independence apart from authority figures such as parents, doctors, and other adults. According to the inquiry data, expert clients stated that as adolescents undergo puberty, they “end up doing the opposite of what they are told to do.” Inclinations for adolescents to go against ART adherence recommendations may be rooted in physiological reactance, and thereby perceive advice given to them by adults as a threat to their freedom of choice. Opposition to adhere to ART against the advice of adults may also be influenced by social norms, or the expected or actual behaviors of their peer groups. Most of the expert clients from our contextual inquiry were adults and were treated as such by adolescents who refer to them as aunts and uncles. Derived from our contextual inquiry, an expert client stated, “if you behave like an adult, they [the adolescents] will treat you like the adult you are.” The contextual inquiry also revealed that ALHIV are more inclined to listen to their adolescent peers due to peer pressure. The desire to conform to their peer groups may also contribute to refusal to adhere to ART. One expert client stated that ALHIV “may tell themselves that, ‘fine aunt [the expert client] said if I use my ARVs [antiretrovirals] and also do drugs then I will forget the time when I should be taking my ARVs and the other drug might make my medication to be very weak,’ but due to peer pressure they fail to refuse when their friends invite them to do things that could be detrimental to their health.” These findings indicate that adolescents may reject the advice given to them by adult treatment supporters to alternatively adhere to the behavior of their adolescent peer groups.
Generate Step Results

During our validation process, we generated prototypic intervention ideas to be considered in BE-informed interventions led by expert clients to improve ART adherence among ALHIV in Eswatini. After eliciting feedback from expert clients regarding our initial ideas, we refined and synthesized them into four prototypes. Table 10 (Appendix A) links each prototype idea to the behavioral barriers and underlying constructs. Based on expert client feedback, these prototypes were considered feasible to implement with no or minimal costs. Concrete examples of the finalized prototypes and expert client perspectives regarding our initial ideas are outlined in Appendix J and Appendix K, respectively.

Regret Lotteries

Expert clients mutually agreed that regret lotteries could be a compelling approach to promote ART adherence among adolescents. A lottery can incentivize adherence by leveraging cognitive biases such as hyperbolic discounting and overconfidence bias. Lotteries may be effective at behavior change because of the human tendency to overestimate probabilities of winning (overconfidence bias) and to prefer small immediate rewards over larger ones in the future (hyperbolic discounting). Unlike conventional lottery incentives, regret lotteries may be more impactful as it harnesses the human tendency of regret aversion.

We hypothesized that we can further motivate adherence through group-based regret lotteries where lottery wins would be contingent upon the adherence of an entire group. We propose that group dynamics may foster cohesion and thereby encourage motivation to achieve a common goal. Group-based lotteries may be more effective than individual participation due to increased witnessability and peer influence, perhaps
counteracting negative social norms and heuristics associated with taking ART medications. Group lotteries can leverage peer pressure since the behavior of a single person would impact the entire group. Group lotteries may also leverage reference dependence by allowing adolescents to observe the performance of their peers which may motivate them to perform better. Lastly, the lottery system can leverage peer support and accountability, factors suggested by the expert clients as a huge driver of treatment adherence within Teen Club.

The rapid validation process confirmed that incentives that included food or money may not be ideal because expert clients strive to empower adolescents to develop resilience by helping them build capacity in utilizing their own skills to generate income. Rather than incentivizing with money or food, expert clients agreed with the idea of incentivizing adolescents with a small reward such as mobile airtime or recreational items they enjoy such as a soccer ball or radio. Although expert clients favored the idea of group lotteries, they were concerned that this activity may provoke competition and negatively impact peer relationship dynamics. Despite their qualms, expert clients would consider implementing group-based lotteries.

Commitment Contracts

Expert clients favored the idea of using a commitment device, particularly commitment contracts, to promote ART adherence among adolescents. Commitment contracts were deemed to be a simple activity that expert clients can implement to encourage precommitment to adherence. Expert clients can encourage adolescents to sign commitment contracts that specifically outline their implementation prompts—specifically their plan to achieve the goal of ART adherence—and hold them accountable to their commitment. Having adolescents write down their implementation
intentions may increase the likelihood of achieving the goal. Commitment contracts allow for adolescents to make their own choice to commit to a behavior and implementation prompts give them the autonomy to create their own plan of action which may mitigate psychological reactance.

As implicated by the *hot-cold empathy gap* phenomenon, adolescents may overestimate their ability to commit to adherence during emotional or visceral states. Therefore, expert clients can encourage adolescents to set goals during “cold” states, when their thoughts are less likely to be influenced by “hot” states such as visceral feelings (e.g., hunger, fatigue) or emotions. When in cold states, adolescents can therefore make a realistic ART adherence plan to prepare for hot states. The commitment contracts may serve to motivate adolescents to take their medications irrespective of their emotions. Additionally, the commitment contracts may strengthen adherence behavior when paired with a reward. Therefore, commitment can be considered in tandem with group-based regret lotteries (i.e., adolescents have a chance to be rewarded for keeping their commitment).

**Message Framing**

According to behavioral economics theory, our choices can be influenced by the way available options are framed or presented, a principle known as the *framing effect*. For instance, messages can be framed in terms of the potential gains of the choice and potential losses associated with not making the choice. Expert clients play an important role in sending educational messages regarding HIV self-management and ART adherence. Therefore, expert clients can leverage gain-framed messages or loss-framed messages around ART to nudge adherence behavior. Loss-framed messages may have a greater impact due to *loss aversion*, a human tendency to prefer avoiding a loss than
acquiring a gain of an equivalent value. Expert clients can frame ART adherence as a
gain or a loss with messages like “consistently taking your medications will give yourself
the opportunity to healthily experience your teenage years with your friends” and “if you
don’t take your medications, you will lose the opportunity to live as a healthy teenager
and miss out on hanging out with your friends.” As the contextual inquiry data revealed,
adolescents value their peer relationships and therefore framing messages to reflect
nonadherence as a loss in the context of their peer relationships may nudge adherence.
Messages around regret lottery participation can be framed to leverage loss aversion
such as “if you don’t take ART, you can lose your chance to win the lottery.” We can
later test whether gain-framed or lost-framed messages have a greater impact on
adherence. Overall, expert clients generally favored the idea of using these messages to
promote ART adherence.

Expert clients also expressed their willingness to utilize other forms of message
framing. For instance, ART adherence messages can also be framed as social norms
which may reduce HIV-related stigma, promote HIV acceptance, and eliminate
apprehension around ART consumption: “Did you know that 2,500 adolescents in
Eswatini are taking the same medications you take? That’s around the same number of
young Swazis who use social media each day.” To address psychological reactance,
ART adherence messaging can be framed as an avenue to build autonomy by allowing
them to live free from HIV-related illnesses. Additionally, adherence can be framed in
such a way to address the scarcity mindset with messages like “ART is a necessity for
your health and longevity just as much as food and water.” Expert clients also favored
the idea of framing ART adherence as a personal gift to create a sense of reciprocity.
On the other hand, several expert clients did not favor messages that evoke peer comparison such as “88% of your peers took all of their medications this month.” We hypothesized that such messages would promote relative ranking whereby peer comparison may motivate adolescents to improve their adherence after comparing their performance with that of their peers. However, expert clients explained that these messages may demotivate adolescents and make them feel inferior among peers who have better adherence than them. Some expert clients agreed that these messages can be used but with caution, so long as the messages are delivered politely and in a nonjudgmental manner.

**Messenger Effect**

In the context of behavioral science, the extent to which we heed information is influenced by the person communicating the message, also known as the messenger effect. In the context of nudging ART adherence among adolescents, it is plausible that the messenger is just as important as the message. Our contextual inquiry data confirm that adherence behavior among ALHIV can be influenced by their adolescent peers. We hypothesized that educational messages around the importance of daily ART adherence may hold more weight among adolescent expert clients than the same messages delivered by an adult expert client. We also hypothesize that the delivery of messages pertaining to ART adherence from adolescent expert clients will have a positive effect due to in-group bias. Our validation steps corroborate our hypothesis that instruction from adults may be perceived as a threat to adolescent autonomy. As endorsed by the expert clients, we also hypothesize that leveraging peer effects may potentially reduce reactant behavior in that adolescents may be more receptive to ART adherence advice provided by an adolescent peer than by an adult. Additionally, adolescents may be more
open to receiving education on side effects from younger-aged expert clients who are also on ART and have successfully taken their medications without food, which may mitigate negative mental models around ART consumption.

**Discussion**

We provide novel behavioral insights regarding ART adherence behavior among ALHIV in Eswatini that may be applied in similar contexts throughout sub-Saharan Africa. While the current literature widely acknowledges structural barriers related to ART adherence among ALHIV, we provide a unique lens by considering potential cognitive biases that may further explain the nuances to ART adherence behavior among Swazi adolescents. Behavioral economics theory can explain adherence behavior and potentially provide solutions to nudge optimal adherence choices. Our work is formative in that it provides preliminary steps for researchers to test BE-informed interventions in future work. Our validation process demonstrates that expert clients can leverage their status as peers to potentially nudge ART adherence by incorporating BE-informed prototypes in their preexisting interventions. Our prototypes are simple and low-cost interventions, and thus seem feasible to implement in resource-poor settings. Additionally, our prototype ideas align with robust influences on human behavior such as message framing, incentives, and commitments (334, 335).

**Implications of the Discover Step**

The hypothesized barriers to ART adherence identified in our study overlap with barriers previously identified in the literature. According to MacCarthy and colleagues’ (336) qualitative study, taking medications in a school setting is perceived as a “public marker of HIV status” among ALHIV in Uganda. Similar to the findings in our study, Ugandan adolescents expressed that the school setting made it difficult for them to take
their medications due to the risk of HIV disclosure among their friends and peers (336). Additionally, our validation steps confirm that peer pressure can also interfere with ART medication-taking, a barrier also identified by MacCarthy and colleagues (336). Our findings also indicate that internalized stigma, especially fear of rejection and discrimination, remains a prominent barrier to ART adherence among ALHIV in sub-Saharan Africa as verified in other studies (54, 61, 138, 336-338). Our study adds behavioral insights into the existing HIV stigma literature by highlighting heuristics and mental models that may perpetuate feelings of shame and fear of disclosure.

We identified undesirable side effects and food insecurity as barriers to ART adherence among Swazi adolescents, which is corroborated by other studies evaluating determinants of ART adherence among ALHIV in sub-Saharan Africa (54, 336). Similar to our findings, MacCarthy et al.’s (336) qualitative findings reveal that poverty is perceived as an immediate contributor to poor ART adherence and an issue particularly relevant in child-headed households. Like our findings, the authors indicate that adolescents who are food insecure may not take ART to avoid the undesirable side effects associated with medication consumption without food (336). Our study provides novel behavioral insights to address these concerns. Similar to our proposal, Brewer and colleagues (324) hypothesized that visceral reactions to unwanted side effects (i.e., hot-cold empathy gap) may hinder micronutrient powder use among caregivers of children with anemia in Peru. Exploring the impact of cognitive biases on adherence may lead us a step further into mitigating common barriers of adherence faced by adolescents in resource-poor settings.

We hypothesized that adolescents are psychologically impacted by scarcity which in turn affects their treatment adherence. This is consistent with other literature
that confirm poverty and low socioeconomic status as determinants of medication adherence behavior (339-342). According to traditional economics, the concept of scarcity is considered only as a physical or structural limitation. However, Mullainathan and Eldar expanded the concept by underscoring the psychology of scarcity (i.e., scarcity mindset) in which the lack of resources depletes our cognitive resources and ultimately shapes our choices (343). Scarcity alters our choices by constantly interrupting our thinking, thus creating a mindset of intense focus on the scarce resource which exhausts cognitive capacity and creates a vicious cycle of constant trade-off and myopic thinking (343-345). Poverty itself limits cognitive functioning (346), and a scarcity mindset alters neural processing (347). The syndemic threat of food insecurity and HIV throughout sub-Saharan Africa draws attention to the potential impact of a scarcity mindset on treatment outcomes (348). According to Aibibula and colleagues’ (349) meta-analysis, food insecurity was associated with a 29% lower odds of achieving viral suppression. Therefore, our research provides important implications for health disparities researchers by underscoring the potential impact of scarcity mindset within the context of poverty, a widely acknowledged social determinant of health.

Our identification of psychological reactance as a potential behavioral barrier aligns with new knowledge regarding adolescent ART adherence predictors. Lowenthal and colleagues (350, 351) identified psychological reactance as a novel risk factor for ART treatment failure among ALHIV between the ages of 10 and 19 in Botswana. The authors found that reactant adolescents are at a 14% higher odds of treatment failure when adjusting for age, sex, and orphanhood status (350). Reactance was also identified in a qualitative study evaluating barriers to ART adherence among ALHIV in the United States (352). Corroborating our contextual inquiry data, Lowenthal et al. (350)
found that reactant adolescents tended to be older than non-reactant adolescents (median age 16.9 versus 15.6 years, p = 0.001). Additionally, the literature supports that increasing age is associated with worsening HIV care retention among ALHIV (141, 142, 177, 179, 353). Our contextual inquiry data suggest that adults may be driving reactant behavior and therefore can be explored in future work.

Our study also demonstrates that parental delayed HIV disclosure to perinatally infected adolescents remains an ongoing challenge, as verified by the existing literature (354-359). While parental disclosure issues are widely documented, we used behavioral insights to explore and address the emotional impact of delayed disclosure on ART adherence. Previous research indicates that early and full disclosure promotes improved HIV adherence among adolescents (360). Therefore, behavioral insights to delayed disclosure can be explored in future work to potentially nudge timely disclosure among parents.

**Implications of the Generate Step**

We proposed integrating two BE-informed prototypes, commitment contracts and implementation prompts, to improve ART adherence intentions and behavior among ALHIV. Prompts are simple and inexpensive interventions which make application feasible in resource-limited settings. Additionally, implementation prompts fill the gap between intention and behavior, a gap often unaddressed in well-regarded social-cognitive theories such as the theory of planned behavior (361, 362). Implementation prompts to write down a date and time to receive the influenza vaccine significantly increased vaccinations by 4.2 percentage points among American adults (363). However, more research is needed to determine the efficacy of implementation prompts on improving medication adherence while also acknowledging that the success of the
prompts depend largely on one’s intentions (361). We also proposed pairing commitment contracts with a regret lottery to further nudge ART adherence behavior. Commitment contracts when paired with a conditional monetary incentive was associated with a higher odds of viral suppression among adults with poor ART adherence in the United States (364). However, it is unclear whether nonmonetary incentives will have a similar effect among adolescents in resource-limited settings. We can therefore test the efficacy of commitment contracts with and without a nonmonetary incentive in future work.

The current literature provides implications for the potential efficacy of our proposed gain-framed and loss-framed message prototypes. For instance, Hafner and colleagues found that messages framed as financial and environmental gains increased behavioral intentions to use an energy-efficient technology (365, 366). On the other hand, Farrell and colleagues found that loss-framed messages were more effective at driving engagement in a welfare-to-work program than gained-framed messages (367). However, message framing can potentially backfire and produce opposite of the intended effect. Sasaki and colleagues found that gain-framed COVID-19 prevention messages reduced the frequency of social contact, but compliance to infection prevention behaviors worsened overtime after repeated exposure to the messaging (368). While behavioral economics theory suggests that loss-framed messages will hold more weight due to loss aversion, an important consideration to note is that the success of gain-framed and loss-framed messages are contingent upon the context and setting. Although prior research suggests that message framing is particularly important to the success of interventions targeting adolescent behavior change (369), more research is
needed to determine the comparative efficacy of loss-framed and gain-framed adherence messaging.

Furthermore, psychological reactance is a common phenomenon during adolescent development and provides implications on adolescent receptivity to health messaging (370). For instance, researchers indicate that maternal nagging affects adolescent brain activity by activating anger-related regions and reducing activity in regions associated with behavior change (371). Thus, ART adherence messages hold the potential to evoke psychological reactance if framed in ways that undermine adolescent agency and autonomy. We hypothesized that reactance may be reduced by framing messages to promote autonomy and using implementation prompts to expand choice options. Although we expect less reactant behavior with increasing autonomy, Lowenthal and colleagues (350) found that autonomy over medication-taking did not modify the relationship between psychological reactance and treatment failure among ALHIV in Botswana. While autonomy framing and choice-enhancing messages have demonstrated efficacy in reducing reactance in previous work (372-374), future research is needed to ensure that our messaging prototypes are not counterproductive. Future work can also determine how visceral states affect adolescent receptivity to ART adherence messaging.

We hypothesized that peer messaging and relative ranking will be particularly effective due to the substantial role of peer influence on adolescent decision-making (375-377). While peer effects on adolescents are often acknowledged in terms of inducing risk behavior (378, 379), peers can also play a role in promoting prosocial behavior (380-383). We can test the efficacy of the messenger effect by examining whether ART adherence instructions are better received among adolescent versus adult
expert clients. According to Smith and colleagues (384), peer promoters of HIV prevention messaging improved HIV testing uptake among South African men. The literature suggests that peers can also encourage HIV acceptance (74), and therefore potentially address the negative impacts of stigma and delayed disclosure found in our study. Peer-facilitated interventions have been associated with improved medication adherence in previous work (156), which point to the potential success of our proposed messenger prototype. Additionally, the available evidence suggests that relative ranking may improve ART adherence among ALHIV. MacCarthy et al.’s (117) pilot of a text messaging intervention demonstrated preliminary efficacy in improving ART adherence among adolescents in Uganda when given information about the adherence levels of their adolescent peers.

While the expert clients in our study favored the idea of regret lotteries, there is minimal evidence in the literature that points to its potential efficacy among adolescents in resource-limited settings. Although a growing number of research supports the efficacy of incentives on ART adherence in sub-Saharan Africa, most of them were trialed in adult populations while utilizing food or cash as the incentive (385-388). Although the expert clients in our study suggested that group-based incentives may lead to negative group dynamics, Galárraga et al. (175) found no evidence of bullying and other undesirable group behaviors in their intervention. These findings underscore the potential utility of our proposed group-based lottery prototype.

According to expert client feedback, incentivizing behavior with food and financial incentives may reduce adolescents’ efficacy to independently improve their livelihoods. Additionally, the long-term impact of incentives may be counterproductive by creating a crowding-out effect whereby intrinsic motivations to perform the desired behavior are
crowded out by the extrinsically motivated incentive (108, 389, 390). These means of incentivizing may potentially exploit the vulnerabilities of food insecure adolescents and even fade the lines between nudging and undue influence. Alternatively, we could consider interventions that promote sustainable livelihoods and asset ownership through financial skills building and income-generating activities (IGAs). Although these activities are informed by traditional economics rather than by BE, such interventions can potentially reverse food insecurity and the adverse effects of the scarcity mindset on health behavior. For instance, an economic empowerment intervention (i.e., Suubi+Adherence) comprising financial education, incentivized saving accounts, and IGAs was associated with long-term improvements in ART adherence outcomes among ALHIV in Uganda (196). While our BE-informed prototypes do not directly address structural barriers to ART adherence such as poverty, behavior interventionists can leverage behavioral insights regarding scarcity to potentially improve adherence behavior.

Limitations

While the use of novel behavioral insights and stakeholder feedback are a major strength, this study is not without limitations. Since we relied on qualitative data pulled from a small number of transcripts, the transferability of our proposed behavioral barriers may be limited. Additionally, our prototypes need to be tested in future work to determine real-world efficacy and acceptability among ALHIV. Although the behavioral barriers we identified were supported by our contextual inquiry data and validated by stakeholder feedback, the underlying BE constructs associated with each barrier are hypothetical and not empirically verified. Furthermore, traditional design thinking approaches involve direct feedback from the end-users (320). In the context of our investigation, the end-
users are ALHIV. However, we only received feedback from the potential implementers of the prototypes and not the end-users themselves. Despite these limitations, the unique identity of expert clients as peers and the nature of their job as promoters of ART adherence provide them with valuable and relevant insight into adolescent ART adherence behavior which we considered in our prototyping.

**Conclusion**

Overall, our research demonstrates the utility of a novel behavioral design approach for diagnosing barriers to ART adherence among Swazi ALHIV and subsequently developing potential solutions to improve adherence behavior. Our study also demonstrates how peer lay health workers can be leveraged to further understand the nuances of ART adherence barriers from a behavioral science perspective. We developed simple, low-cost intervention prototypes to address behavioral barriers to ART adherence which were deemed feasible to implement in resource-poor settings. Overall, our BE-informed barriers and prototypic intervention features can be considered in future trials aimed at improving behavioral barriers to ART medication use among adolescents.
CHAPTER 5: CONCLUSION

Introduction

The overall goal of this dissertation was to provide novel considerations for optimizing the design and implementation of peer support interventions for adolescents living with HIV (ALHIV) in sub-Saharan Africa (SSA). The aims of the dissertation were dedicated to fulfilling this goal. Chapter 2 (Aim 1) highlights the current gaps in the literature concerning peer support interventions targeting ALHIV in SSA which can be used to inform future research, design, and implementation. Chapter 3 (Aim 2) underscores potential implementation determinants pertaining to the peer delivery of a brief psychological intervention (i.e., Friendship Bench) tailored for ALHIV in Botswana. Chapter 4 (Aim 3) offers novel insights from behavioral economics (BE) regarding behavioral barriers to antiretroviral therapy (ART) adherence among ALHIV in Eswatini which informed the design of intervention prototypes to address the barriers.

This conclusion chapter begins with considerations for reconceptualizing peer support. The remaining sections highlight implications, limitations, and future directions for research. Finally, the chapter ends with a concluding statement.

Reconceptualizing Peer Support

This dissertation offers new considerations regarding the concept of peer support. As discussed in Chapter 1, Dennis (79) created an empirically supported conceptual model of peer support with the goal of helping nurses “effectively develop, implement, evaluate, and compare peer support interventions while also serving as a guide for further conceptual and empirical research” (p. 321). According to Dennis’ (79)
conceptualization of the antecedents of peer support, peers have similar characteristics related to age, identity, stressor, and/or health concern. While shared stressors make peers relatable, it is important to consider the unintended consequences of shared traumatic experiences. As we found in Chapter 3, shared trauma can have a negative impact on the psychological wellbeing of peer counselors. Therefore, shared stressors may not be useful for peer supporters in certain contexts, especially in the context of peer-led counseling interventions. This is consistent with other literature describing the emotional burden of shared stressors among peers delivering Friendship Bench and other psychosocial support services to ALHIV in Zimbabwe (269, 391). However, there is some evidence to suggest that lay providers of Friendship Bench demonstrate resilience despite shared and vicarious trauma exposure among their clients (392, 393). Additionally, age may be a vital antecedent to consider in peer support interventions for adolescents. For instance, in Chapter 3 we found that peer counselors have a relative advantage over adult clients due to closeness in age. In Chapter 4, we found that adolescents may not be receptive to adherence instruction from adult expert clients. This is consistent with other studies which suggest that age matters when delivering interventions to adolescent populations (369). Although these considerations are not conclusive, they may be useful for reconceptualizing peerness based on context.

Overall Implications

Implications for Nursing Science and Practice

The empirical findings derived from this inquiry provide several implications for advancing nursing knowledge and practice. As aligned with the practice of nursing, the
findings demonstrate that peers are invested in the wellbeing of their clients and are advocates for their needs. Nurses play a vital role in promoting health through disease prevention, health education, and therapeutic interventions. Peer support coincides with the health-promoting role of nurses as demonstrated by the contributions of peer counselors (Chapter 3) and expert clients (Chapter 4) serving ALHIV. Consistent with other literature (34, 35, 128), the findings of this dissertation suggest that peers have the capacity to improve nursing practice by enhancing the health promotion efforts of nurses, filling gaps in nursing care, and improving accessibility and uptake of healthcare services. Despite its benefits, peer support remains an underutilized resource (394-396). This dissertation adds to nursing knowledge by providing ways in which peer support can be utilized to improve healthcare access and health outcomes.

Overall, this dissertation offers three main considerations for building knowledge to advance nursing as a science and practice:

1. Peer supporters have the potential to improve nursing practice by enhancing the health-promoting role of nurses.
2. Implementation science provides nurses with conceptual and theoretical tools to promote successful implementation of peer support interventions in real-world practice.
3. Behavioral economics can be incorporated into nursing research and practice to promote positive health behaviors.

Implications for Innovation and Human-Centered Design

In Chapter 4, a novel approach rooted in design thinking was utilized to design prototypes for solving behavioral barriers to ART adherence among Swazi adolescents.
Design thinking is a human-centered approach that involves gathering data, generating ideas, and using creativity to develop solutions to a problem (397). Human-centered design (HCD) approaches are increasingly recognized as a key healthcare innovation and an essential competency for nurses (398-400). HCD has also been utilized by nurses to improve patient outcomes (400, 401). A HCD approach was used to adapt a nurse-led intervention to reduce cardiovascular disease (CVD) risks among people living with HIV (402). Implementation outcome measures such as acceptability and feasibility were also used to evaluate the integrated CVD/HIV intervention. Since ALHIV are at considerable risk for mental health problems, we can consider utilizing human-centered design approaches to develop integrated HIV and mental health interventions for this population. As discussed in Chapter 4, expert clients are integral to the provision of medication adherence support for ALHIV. Therefore, we can potentially use HCD to develop ways to integrate the problem-solving therapy elements of Friendship Bench into ART adherence interventions for this population.

The use of the NUDGE framework, a human-centered design approach, in Chapter 4 has several health research and policy implications. NUDGE demonstrates the utility of incorporating BE principles into HCD approaches to promote positive behavior change. Additionally, the humanness of HCD acknowledges “stakeholder participation, augmenting human skills, and attention to human values” (403, p. 477), which has the potential to address health equity (403, 404). In Chapter 4, the design process was centered around stakeholder perspectives. We found that expert clients’ role as peer supporters allow them to provide valuable insights into the behavioral barriers to antiretroviral therapy adherence among the adolescents they serve. As peers, expert clients also have experiential knowledge regarding the needs of ALHIV, thus
making them important stakeholders for the development of behavioral economics-informed interventions. The NUDGE process revealed that BE interventions can also be implemented at a low-cost. This may draw attention to policymakers who are interested in adapting cost-saving, creative, and attractive interventions to address public health issues. Additionally, the NUDGE approach is a unique method of design thinking that can be considered by behavioral interventionists seeking innovative approaches to intervention development. Lastly, we can explore HCD as a science by exploring its impact on the implementation of health interventions and patient outcomes.

**Implications for Behavioral Economics and Implementation Science**

In this dissertation, implementation science (IS) and BE principles were applied separately in Chapter 3 and Chapter 4, respectively. However, there is potential to merge these two disciplines in future work. BE and IS are two fields that can be used together to implement health-promoting interventions practically and realistically. For instance, behavioral economics takes a realistic view of human heuristics and patterns of human decision-making which can be used to create practical interventions to nudge desirable health behaviors. On the other hand, implementation science realistically considers contextual factors that influence successful and practical implementation of evidence-based interventions. Additionally, BE offers a unique opportunity to address cognitive and attitudinal influences on implementation outcomes (405). For instance, the results from Chapter 3 indicate that parental attitudes around counseling can potentially impact client use of Friendship Bench. While this finding was generated in a small sample, it does show promise for the use of insights from behavioral economics to create implementation strategies to potentially nudge parental acceptability of the
intervention. In fact, behavioral nudges have been explored in the literature as an implementation strategy to increase adoption and penetration of evidence-based treatments and guidelines (112, 406, 407). Lastly, we can use scientific knowledge regarding robust influences on behavior (334) to design BE interventions and subsequently evaluate them using implementation outcomes. Hence, there are multiple opportunities to merge the two disciplines to optimize the design and implementation of interventions for ALHIV in SSA and perhaps within other populations and contexts.

Limitations and Future Directions

While this dissertation offers important considerations for designing and implementing optimal peer support programs for ALHIV in a SSA context, there are several limitations that should be considered. The study samples for Aim 2 and Aim 3 were small and not sufficient to make general conclusions regarding the findings. However, we identified some overlap between the findings in this dissertation and preexisting knowledge from the literature. Additionally, we have only queried peer supporters (i.e., expert clients and peer counselors) and not their adolescent recipients. To address this gap in Chapter 3, adolescent clients of Friendship Bench can be queried in future work to obtain their insights regarding the implementation of Friendship Bench. Likewise, we can engage adolescent clients in further development and pilot testing of the proposed intervention prototypes in Chapter 4. Lastly, we relied on secondary qualitative data to fulfill Aim 2 and Aim 3. Therefore, it is important to note that the participants of these studies provided perspectives based on the original research aims under which the data were collected, and not based on the study aims of this dissertation.
While nudging can be used as an innovative strategy to improve health behavior, there are a few limitations to using this method. Although nudges are intended to preserve freedom of choice (111), the use of nudges raises several ethical questions with regard to paternalism. For example, who should nudge and when is nudging appropriate? Where do we draw the line between nudging and undue influence? How do we avoid crowding out intrinsic motivations when we use extrinsically motivating nudges such as incentives? When it comes to financial incentives, what measures should be taken to avoid exploiting the financial needs of those living in poverty? Lastly, how do we avoid perpetuating Western paternalism within African nations? Another limitation is that nudging does not address structural barriers that influence health behavior and health outcomes. Therefore, it is important to acknowledge behavioral issues that cannot be addressed solely at the individual level. If considering the use of nudges in policy and practice, we must acknowledge systemic, or “s-frame”, barriers such as poverty and its impact on individual-level, or “i-frame”, choices (408).

In future work, we can consider implementing hybrid implementation-effectiveness trials in application of the findings from this dissertation. In Chapter 3, implementation strategies can be developed to address behavioral barriers to Friendship Bench implementation among ALHIV such as parental disapproval. Implementation strategies can later be evaluated using a type II hybrid implementation-effectiveness trial to simultaneously test implementation strategies and the effectiveness of Friendship Bench among ALHIV. Likewise, the intervention design prototypes developed to nudge behavioral barriers to ART adherence among ALHIV can be dually tested for efficacy and implementation outcomes using a type I hybrid implementation-effectiveness trial.
design. These trials can provide insights needed to further optimize the design and implementation of peer support interventions for ALHIV in SSA.

Lastly, mental health is a paramount need for ALHIV in SSA. As discussed in Chapter 3, the prevalence of psychiatric disorders among ALHIV in SSA is between 20% and 27% (60). In future work, we can consider evaluating the acceptability and feasibility of training expert clients to deliver psychotherapy via Friendship Bench. Other studies suggest that the integration of psychotherapy into peer-led HIV interventions may be feasible. A similar approach was trialed by Simms and colleagues (240) in which ALHIV known as community-adolescent treatment supporters were trained to deliver problem-solving therapy to ALHIV in Zimbabwe. Simm and colleagues’ (240) intervention was associated with significant improvements in common mental disorders such as depression and anxiety. Likewise, Donenberg and colleagues (239) tested the efficacy of a peer-delivered trauma-informed cognitive behavioral therapy enhanced to address ART adherence among ALHIV in Rwanda. Donenberg et al.’s (239) trial demonstrated efficacy among adolescents with lower depression and anxiety scores at baseline. However, Simm et al. (240) and Donenberg et al. (239) did not find any improvements in adherence outcomes as a result of these counseling interventions. In future work, we can consider the design of a peer-led intervention consisting of ART adherence nudges and psychotherapy as a novel strategy to simultaneously address HIV treatment outcomes and mental health outcomes among ALHIV in SSA.

**Overall Conclusion**

The lay provision of health services by peers demonstrates the potential to optimize interventions for ALHIV in SSA. Additionally, peer lay health workers (PLHWs)
show potential to fill gaps in nursing care. While PLHWs do not replace the voices of their beneficiaries, they demonstrate the ability to advocate for them due to mutual experiences and similar needs. In this dissertation, we see how PLHWs operate conceptually as health promoters and advocates. This dissertation also provides some evidence to support the utility of peers in facilitating health promoting interventions. Additionally, we highlight ways to advance knowledge around peer support interventions for ALHIV through behavioral economics and implementation science. We have learned that peers provide valuable insights into the needs of ALHIV which can be used for optimizing the design and implementation of peer support interventions for this population. The overall findings and insights from this dissertation provide the preliminary steps for future work utilizing behavioral economics and implementation science to optimize peer support interventions to address health outcomes among ALHIV in SSA.
## APPENDIX A: TABLES

### Table 1. Table of evidence

<table>
<thead>
<tr>
<th>Author</th>
<th>Country</th>
<th>Study Design</th>
<th>Participants</th>
<th>Intervention</th>
<th>Description</th>
<th>Comparison</th>
<th>Outcomes</th>
<th>Key Findings</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Darrow et al. (173)</td>
<td>Zambia</td>
<td>Randomized controlled trial</td>
<td>Adolescents and young adults 15 to 24 years (n=137)</td>
<td>Intervention arm: Adolescents and young caregivers (if invited by the youth participant), Participants met with YPM once per month over 6 months and were invited to monthly youth group meetings facilitated by YPM.</td>
<td>Standard of care with invitation to optional monthly youth group meetings; started intervention after 6-month midline data collection</td>
<td>Viral suppression (viral load test result of &lt;1,000 copies/ml) ART adherence treatment gap (self-report of missed doses in 48 consecutive hours or more in past 3 months)</td>
<td>After 6 months, there was significant arm by time interaction with the intervention arm having an increased odds of viral suppression by a factor of 4.7 compared to the comparison arm (interaction term OR: 4.68, 95% CI 1.84, 11.70) in pediatric setting. There was relative improvement in adherence in intervention arm (OR interaction term=0.63, 95% CI 0.35, 1.13) with 45.3% treatment gap at baseline and 34.4% at midline (6 months), but not significant. No adherence changes among comparison arm (OR=1.05, 95% CI 0.68, 1.61).</td>
<td>Overall Quality: Moderate</td>
<td>Limitations: Self-reported adherence for some measures, possible contamination, findings are from 6-month midline data collection</td>
</tr>
<tr>
<td>Dow et al. (174)</td>
<td>Tanzania</td>
<td>Stepped-wedge individually randomized group treatment trial</td>
<td>Adolescents and young adults 12 to 24 years (n=58)</td>
<td>Intervention Group: Adolescents and young adults 12 to 24 years (n=58)</td>
<td>Description: Sauti ya Vijana (i.e., The Voice of Youth) comprised of ten group sessions, two which included caregivers and two individual sessions between the participant and one group leader.</td>
<td>Standard of care per national Tanzanian guidelines</td>
<td>Hair ART drug concentration as a cumulative measure of ART adherence; five mL blood sample was drawn to measure HIV RNA; self-reported adherence by a validated three-question survey</td>
<td>The was a 7.29 unit increase in self-reported adherence in intervention arm compared to control arm (95% CI: 2.2, 12.3). Virologic suppression rate increased from 65% to 75% in the intervention arm and remained the same in SOC arm after 6-month follow up (adjusted risk ratio = 1.13; 95% CI = 0.94, 1.36). The change in standard deviation for all ART concentration values increased by 0.17 units greater in the intervention arm compared to the control arm (95% CI = 0.35, 0.85).</td>
<td>Overall Quality: Moderate</td>
</tr>
<tr>
<td>Dulli et al. (172)</td>
<td>Nigeria</td>
<td>Randomized controlled trial</td>
<td>Adolescents and young adults 15 to 24 years (n=177)</td>
<td>Intervention group: Adolescents and young adults 15 to 24 years (n=177)</td>
<td>Description: Social Media to promote Adherence and Retention in Treatment (SMART) Connections, mHealth intervention</td>
<td>Standard of care (recorded date for all scheduled clinic visits; non-retention if failed to return to clinic)</td>
<td>Retention in care (recorded date for all scheduled clinic visits; non-retention if failed to return to clinic)</td>
<td>No statistically significant differences between study arms regarding retention in care (p=0.95) and ART adherence (p=0.57).</td>
<td>Overall Quality: Moderate</td>
</tr>
<tr>
<td>Study</td>
<td>Country</td>
<td>Design</td>
<td>Intervention Details</td>
<td>Description</td>
<td>No. Patients</td>
<td>Comparison Group</td>
<td>Self-reported Adherence</td>
<td>LTFU</td>
<td>Risk of LTFU</td>
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<tr>
<td>Galarraga et al. (175)</td>
<td>Ghana</td>
<td>Quasi-experiment (pilot study)</td>
<td><strong>Intervention Group</strong>: Perinatally infected adolescents 12 to 19 (n=35)</td>
<td>Self-reported adherence using visual analog scale, viral load (&lt;50, 50–499, 500–4,999, ≥5,000)</td>
<td>30</td>
<td>Group: CAC</td>
<td>0.19 decrease in missing doses was statistically significant (95% CI: 0.38, 0.38)</td>
<td>Moderate</td>
<td>No comparison group, small sample size</td>
</tr>
<tr>
<td>Graves et al. (176)</td>
<td>Ghana</td>
<td>Cluster randomized controlled trial</td>
<td><strong>Intervention Group</strong>: Family Clinic Day (FCD) involved: 1) patient scheduling on a designated day, 2) health education sessions, 3) patient flow (prioritization of adolescents and their families during FCD designated day)</td>
<td>Retention in care (attended ART clinic appointment at least once over the last 3 months of study period) and adherence to appointment schedule (returned to clinic before running out medication received at last appointment)</td>
<td>581</td>
<td>Group: CHC</td>
<td>There was no statistically significant difference in the odds of retention between study arms (crude odds ratio=1.03, 90% CI 0.56-1.68, p=0.94)</td>
<td>Moderate</td>
<td>Missing data, possible selection bias, possible variability in intervention implementation, short study period</td>
</tr>
<tr>
<td>Grimsrud et al. (170)</td>
<td>South Africa</td>
<td>Retrospective cohort study</td>
<td><strong>Intervention Group</strong>: Adolescents and young adults 16-24 years (n=156) Community Health Centre (CHC) only group: Adolescents and young adults 16-24 years (n=728)</td>
<td>Lost to follow-up (LTFU: no visit in the first 12 weeks of 2014) and viral rebound (a single viral load measurement &gt;1000 copies/ml after previous suppression)</td>
<td>156</td>
<td>Group: CAC</td>
<td>Risk of LTFU was not significantly different among youth in CACs and CHC groups (aHR=0.68, 95% CI 0.37-1.22, p=0.197), while CACs were associated with reduced hazard of LTFU among adults in CACs compared to CHC. Compared to adults, youth twice as likely to be LTFU (aHR=2.17, 95% CI 1.26-3.73) and have viral suppression</td>
<td>High</td>
<td>Short-term report of outcomes, did not account for reasons on LTFU, possible selection bias, possible residual confounding</td>
</tr>
<tr>
<td>Study</td>
<td>Setting</td>
<td>Design</td>
<td>Cases (non-retained patients)</td>
<td>Description</td>
<td>Standard of care</td>
<td>Retention</td>
<td>Overall Quality</td>
<td>Limitations</td>
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<tr>
<td>MacKenzie et al. (177)</td>
<td>Malawi</td>
<td>Nested case-control study (retrospective operation study)</td>
<td>Adolescents 10-19 years (n=135)</td>
<td>Teen Club is a dedicated clinic on Saturdays comprising of sexual and reproductive health education, peer mentorship, ART refills, recreational activities, adolescent-focused group adherence counseling, lunch, and disclosure support.</td>
<td>Control arm: Adolescents aged 10-14 years from care than adolescents with no Teen Club exposure (aOR=0.27, 95% CI 0.16-0.45). Adolescents aged 15 to 19 were more likely to have attrition from care than adolescents aged 10 to 14 (aOR=2.14; 95% CI 1.12-4.11).</td>
<td>No significant difference in virologic failure or death between intervention and control groups.</td>
<td>Moderate</td>
<td>Possible selection bias, possible inaccurate reporting of Teen Club visits</td>
<td></td>
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<tr>
<td>Mayhew et al. (178)</td>
<td>Zimbabwe</td>
<td>Cluster Randomized controlled trial</td>
<td>Adolescents 13-19 years (n=212)</td>
<td>Teen Club exposure was higher among controls versus cases (34.6% versus 17.8%, p=0.01). Adolescents with no Teen Club exposure were less likely to have stopped treatment; died (for any reason), alive on ART, transfer to another facility.</td>
<td>The proportion of participants who had died or had virological failure (defined by an HIV-1 viral load of ≥1000 copies per µL at 96 weeks [window period for inclusion: 88-104 weeks]) after enrolment</td>
<td>Virologic failure and death were less common in intervention group compared to control group (adjusted prevalence ratio=0.58, 95% CI 0.36-0.84, p&lt;0.03). No significant difference in secondary outcomes between intervention and control groups.</td>
<td>Moderate</td>
<td>Implementation challenges (e.g., some peer workers were unable to conduct home visits)</td>
<td></td>
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<tr>
<td>Munyayi &amp; van Wyk 2020 (180)</td>
<td>Nambia</td>
<td>Retrospective cohort study</td>
<td>Adolescents 10 to 19 years (n=78)</td>
<td>Teen Club is a psychosocial peer support group comprised of monthly meetings where adolescents share experiences, receive HIV education, and participate in recreational activities during dedicated clinic day for adolescents.</td>
<td>Adherence to ART as measured pill counts by clinicians and viral load suppression. Retention status (in care, lost to follow-up or transfer out) fully suppressed &lt;40 copies/ml suppressed between 40-999 copies/ml</td>
<td>No significant difference between clinician-measured ART adherence between intervention group and control group after 3 months of follow-up (p=0.277). No significant difference in retention status after 24 months (p=0.931). No significant difference in viral load suppression (suppressed and fully suppressed) at 6 months (p = 0.267), 12 months (p = 0.324), and 18 months (p = 0.64).</td>
<td>Moderate</td>
<td>Missing data, dose effect not considered</td>
<td></td>
</tr>
<tr>
<td>Munyai &amp; van Wyk, 2020 (179)</td>
<td>Nambia</td>
<td>Retrospective cohort study</td>
<td>Teen Club group: Adolescents age 10-19 (n=78)</td>
<td>Description: Teen Club is a psychosocial peer support group comprised of monthly meetings where adolescents share experiences, receive HIV education, and participate in recreational activities during dedicated clinic day for adolescents.</td>
<td>Standard of care: Unspecified</td>
<td>Retention (in care at 24 months) or not in care at 24 months which was defined as lost (missed &gt; 30 days) or lost to follow-up (LTFU; missed &gt; 90 days)</td>
<td>No significant difference between Teen Club and standard of care group in retention in care at 24 months (91% versus 89%, p = 0.956). No statistically significant difference in hazard rates for being lost from care among both groups (p=0.456). Retention rates higher among adolescents 10-14 years as opposed to adolescents 15-19 years which was significant (94% versus 86%, p=0.016).</td>
<td>Overall Quality: Moderate</td>
<td>Limitations: Missing data, potential type II error with inequivalent sample size between groups</td>
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<tr>
<td>Nasuuna et al. (181)</td>
<td>Uganda</td>
<td>Retrospective cohort study</td>
<td>Adolescents 10-19 years receiving intensive adherence counseling (IAC) sessions (n=117)</td>
<td>Description: IAC was offered to patients with HIV viral loads above 100 copies/mL consisting of three monthly intensive adherence counseling sessions followed by a repeat viral load.</td>
<td>Service Delivery Personnel: Nurses and adherence counselors initiate IAC sessions, expert clients conduct IAC sessions</td>
<td>None</td>
<td>Of the patients that received all IAC sessions and had a repeat viral load test, 77% were unsuppressed and 23% were suppressed. There was no significant difference between those virally suppressed and unsuppressed after receiving 3 IAC sessions (p=0.175). Among adolescents 10 to 14 years, 33.8% were suppressed and among adolescents 15 to 19 years, 20% were suppressed.</td>
<td>Overall Quality: Moderate</td>
<td>Limitations: did not control for drug resistance (likely confounder), IAC sessions not conducted as recommended</td>
</tr>
<tr>
<td>Nohlou et al. (182)</td>
<td>Zimbabwe</td>
<td>Randomized Controlled Trial</td>
<td>Intervention arm: Adolescents 10-24 years (n=104)</td>
<td>Intervention: Zvandri, a peer-led package of psychosocial support services informed by the Unified Theory of Behaviour, comprised groups, weekly home visits, monthly support group meetings, caregiver meetings, and WhatsApp messages intended for adherence and clinical reminders and wellness checks.</td>
<td>Service Delivery Personnel: Community Adolescent</td>
<td>Standard of care per country guidelines, included group and individual counseling sessions led by primary care counselors who educated on safe sex, disclosure, dating, and ART adherence.</td>
<td>Viral suppression defined as HIV viral load (VL) of &lt;1000 copies/mL at 12-, 24-, and 36-week follow-up periods. Self-reported adherence (95% or higher) in the past 30 days.</td>
<td>Viral suppression at week 36 low in both groups (31.7% in intervention arm vs 20.4% in SOC). No difference in odds of having detectable VL in both groups (adjusted OR 1.14, 95% CI: 0.82–1.59, p = 0.439) over time.</td>
<td>Overall Quality: Moderate</td>
</tr>
<tr>
<td>Authors</td>
<td>Country</td>
<td>Study Design</td>
<td>Study Details</td>
<td>Intervention Description</td>
<td>Secondary outcome</td>
<td>Primary outcome</td>
<td>Overall Quality</td>
<td>Limitations</td>
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<tr>
<td>Ruria et al.</td>
<td>Nigeria</td>
<td>Pre-post cohort</td>
<td>Preintervention: Adolescents and young adults 15-21 years (n=395) Postintervention: Adolescents and young adults 15-21 years; (n=559) Preintervention data: Early retention in care (proportion of newly diagnosed adolescents and young adults who were initiated and retained on ART at 3 and 6 months after being diagnosed) Retention increased from 66% to 90.0% after 3 months (p&lt;0.001), and from 54.4% to 96.6% after 6 months (p&lt;0.001) Overall Quality: Low Limitations: Poor data quality, no prospective concurrent control group</td>
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<tr>
<td>Stangl et al.</td>
<td>Zambia</td>
<td>Pre-post mixed</td>
<td>Intervention Group A (Chipata community) Adolescent females 15-19 years (n=11) Intervention: Tikambisane ['Let’s Talk to Each Other'], a 6-session, curriculum-based support group intervention designed to address key concerns of adolescent girls and young women living with HIV such as ART, stigma, disclosure, grief. Service Delivery Personnel: A trained team, consisting of an adult HIV counselor and participatory educator and 2 peers living with HIV facilitated each session. Self-reported ART adherence measured using the CASE Adherence Index after 3 month exposure to intervention. Scores greater than or equal to 10 on the CASE Adherence Index reflect better adherence. No significant increase in ART adherence after intervention exposure. CASE Adherence scores ≥ 10 decreased from 85.7% to 84.6% (p=0.140). Overall Quality: Low Limitations: No randomization, no comparison group, small sample size insufficient to detect</td>
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<tr>
<td>Taiwo et al.</td>
<td>Nigeria</td>
<td>Single-arm pilot</td>
<td>Adolescents 15-24 years (n=46) Description: A 48-week combination intervention consisting of daily 2-way text message medication reminders plus peer navigation (adaptation of TXTTXT developed by the CDC). Service Delivery Personnel: Text messages were delivered through the Dimagi Commcare platform. Peer navigators were None. Primary outcome: Viral suppression defined a viral load &lt; 200 copies/mL Secondary outcome: Self-reported 30-day adherence on a visual analog scale (VAS) of 0–100; drug pick-up adherence measured by medication possession. Viral suppression was increased by 94% at 24 weeks from baseline (p&lt;0.01) and 71% from baseline at 48 weeks (p&lt;0.05). Odds of virologic suppression were higher at 24 weeks (OR = 14.00, p = 0.001) and at 48 weeks (OR = 6.00, p = 0.013) compared to baseline. VAS adherence of ≥ 90% increased from 43% to 63% at 24 weeks (p= 0.008) and to 68% at 48 weeks (p = 0.031). MPR ≥ 90% increased. Overall Quality: Moderate Limitations: No control group, did not account for potential drug resistance in sample, small sample size</td>
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<tr>
<td>Study</td>
<td>Country</td>
<td>Study Type</td>
<td>Population</td>
<td>Youth and Adolescent Services</td>
<td>Description</td>
<td>Retention</td>
<td>Limitations</td>
<td>Overall Quality</td>
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<tr>
<td>Teasdale et al. (171)</td>
<td>Kenya</td>
<td>Pre-post cohort study (retrospective)</td>
<td>Adolescents and young adults 10-24 years (n=426 pre-YAFS period and n=304 post-YAFS period)</td>
<td>Non-YAFS facilities:</td>
<td>YAFS services included 1) training and mentorship for health care providers on adolescent/youth HIV care; 2) dedicated day for adolescent/youth HIV clinic, and 3) support groups and education programs run by youth and adult peer educators</td>
<td>No difference in pre-ART LTF between YAFS and non-YAFS facilities in the pre-YAFS period (p=0.08) and no significant differences in LTF in post-YAFS periods between YAFS and non-YAFS facilities (p=0.87). No significant difference in LTF among patients who started ART during YAFS and non-YAFS facilities in either pre- (p=0.73) or post-YAFS periods (p=0.77). No significant difference in LTF in before and after periods solely at YAFS facilities (p=0.19).</td>
<td>Short follow-up period, small sample sizes, did not evaluate quality of service delivered across facilities, did not account for patients who perhaps transferred care (not reported)</td>
<td>Moderate</td>
<td></td>
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<tr>
<td>Vu et al. (186)</td>
<td>Uganda</td>
<td>Pre-post cohort study</td>
<td>Youth 15-24 years who completed baseline and end-line surveys (n=350)</td>
<td>Service Delivery Personnel:</td>
<td>Delivery of services comprised of comprehensive sexual and reproductive health services through community-based peer support groups.</td>
<td>No significant difference in LTF in pre and post periods between YAFS and non-YAFS facilities (p=0.77). No significant difference in LTF in before and after periods solely at YAFS facilities (p=0.19).</td>
<td>Self-reported ART adherence, short follow-up period, small sample size, did not evaluate quality of service delivered across facilities, did not account for patients who perhaps transferred care (not reported)</td>
<td>Moderate</td>
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</tr>
<tr>
<td>Willis et al. (81)</td>
<td>Zimbabw e</td>
<td>Cluster randomized controlled trial</td>
<td>Adolescents 10-15 years (n=47)</td>
<td>Service Delivery Personnel:</td>
<td>Peer-led model comprised of comprehensive sexual and reproductive health services through community-based peer support groups.</td>
<td>After adjusting for relevant covariates, there was a significant increase between baseline and end-line in ART adherence from 84.9% to 91.7% (adjusted odds ratio=2.5, 95% CI 1.3-4.9, significant at p &lt; 0.01)</td>
<td>Short follow-up period, small sample size, possible social desirability bias, low response rate among control arm; randomization at site level</td>
<td>Low</td>
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</tbody>
</table>
Zanoni et al. (187) South Africa Retrospective cohort study Adolescent clinic: Adolescents and young adults 13-24 years (n=88) Standard pediatric clinic: Adolescents and young adults 13-24 years (n=153) Description: Adolescent-friendly clinic opened on Saturdays included ART dispensing, lunch, and group activities (e.g., dancing, soccer, education, counseling) Service Delivery Personnel: Physicians, nurses, and counselors Standard weekday pediatric clinic (appointments with doctors and counselors every 1-3 months and obtain medications) Retention in care (one clinic visit or pharmacy refill in prior 6 months) and viral suppression (<400 copies/ml) within prior 6 months There were significantly higher retention rates among adolescents and youth attending the adolescent clinic compared to those attending standard clinic (AOR=8.5, 95% CI 2.3-32.4, p=0.002). Higher viral suppression rates among adolescents and youth attending adolescent clinic compared to standard clinic (AOR=3.8, 95% CI 1.5-9.7, p=0.005). Younger age was significantly associated with retention in care (AOR = 0.8, 95% CI 0.7–0.9, p = 0.010).

Overall Quality: Moderate Limitations: Missing data, possible overestimation of exposure and unsuppressed viral load, small sample size

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**Table 2. Intervention types**

<table>
<thead>
<tr>
<th>Intervention Type</th>
<th>Description with Study References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group-based peer support (n=10)</td>
<td>A clinical or community-based intervention containing a support group whereby peers are encouraged to interact with one another through group activities such as educational sessions or recreation (170-172, 175-177, 179, 180, 184, 187).</td>
</tr>
<tr>
<td>Individualized plus group-based peer support (n=6)</td>
<td>An intervention that includes an individualized component facilitated by peers plus a peer group component (81, 173, 174, 178, 182, 186). An example of an individualized component is one-on-one adherence counseling, and an example of a group component is a monthly peer support group. Peer facilitation includes providing adherence monitoring and counseling, making referrals, linkage to services, and/or providing peer education.</td>
</tr>
<tr>
<td>Individualized peer support (n=3)</td>
<td>Individualized support provided by a peer such as one-on-one counseling and tailored navigation services to meet individual needs (181, 183, 185).</td>
</tr>
</tbody>
</table>
**Table 3. Finalized Codebook**

<table>
<thead>
<tr>
<th>Codes</th>
<th>Description</th>
<th>Illustrative Quotes/Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barrier and Facilitator</td>
<td>Some of the data will be dichotomized as either a barrier to or a facilitator of the implementation of Friendship Bench.</td>
<td>Family hesitancy around counseling and discordant attitudes about counseling among parents can be considered barriers. Another barrier is clients not showing up to counseling sessions due to schedule conflicts due to school hours.</td>
</tr>
<tr>
<td>Dichotomy</td>
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<tr>
<td>Barrier and Facilitator</td>
<td>Client-level, counselor-level, or external factors that may impede implementation of the Friendship Bench intervention.</td>
<td>Acceptability (or positive perceptions) regarding the Friendship Bench intervention by clients, clients’ family, or counselors; providing transportation reimbursement for travel to counseling sessions.</td>
</tr>
<tr>
<td>Dichotomy/Barriers</td>
<td></td>
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</tr>
<tr>
<td>Barrier and Facilitator</td>
<td>Client-level, counselor-level, or external factors that may facilitate implementation of the Friendship Bench intervention.</td>
<td></td>
</tr>
<tr>
<td>Dichotomy/Facilitators</td>
<td></td>
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</tr>
<tr>
<td>CFIR Domains</td>
<td>Intervention characteristics, outer setting, inner setting, characteristics of individuals, and process</td>
<td></td>
</tr>
<tr>
<td>CFIR Domains\Characteristics of Individuals</td>
<td>Constructs: individual identification with organization, individual stage of change, knowledge and beliefs about the intervention, other personal attributes, self-efficacy</td>
<td>Client personality traits (e.g., being shy); client issues (e.g., clients needing more counseling sessions due to complex issues); peer status of the counselors; beliefs and/or perceptions of counselor or client; client or counselor acceptability of the intervention; counselor communication style or techniques; emotional burden of counselors; counselor self-efficacy based on self-ratings; personal growth and satisfaction experienced by clients or counselors as a result of participating in Friendship Bench.</td>
</tr>
<tr>
<td>CFIR Domains\Inner Setting</td>
<td>Constructs: structural characteristics, networks and communications, culture, implementation climate, readiness for implementation</td>
<td>Culture of the environment in which the intervention is implemented; implementing the intervention in clinical or primary care settings; individuals within the organization who have the authority to integrate the Friendship Bench intervention into standard practice.</td>
</tr>
<tr>
<td>CFIR Domains/Intervention Characteristics</td>
<td>Constructs: adaptability, complexity, cost, design quality and packaging, evidence strength and quality, intervention source, relative advantage, trialability</td>
<td>Counselors not giving personal advice to clients (a component of problem-solving therapy is helping the client figure out their own solutions to their problems). Another example is having 6 counseling sessions with clients every week (6 weekly sessions is a component of the intervention). Another example is counselors asking client questions to understand their clients’ issues and referring clients to social workers or psychologists if a complex issue needs to be addressed. This can also include characteristics of the training (e.g., family issues) or how counselors are taught to communicate with their clients (e.g., patience). Another example is counselors informing clients that their sessions are confidential unless they have to report abuse. Other intervention characteristics is counselors stating that the length of the trainings were too short, and lessons learned from the training (e.g., practicing patience)</td>
</tr>
<tr>
<td>CFIR Domains/Outer Setting</td>
<td>Constructs: cosmopolitanism, external policies and incentives, patient needs and resources, peer pressure</td>
<td>Societal or cultural norms related to the Friendship Bench intervention; stigma or perceptions related to mental health counseling within the community. Anything related to patient needs and resources (e.g., patients needing special transportation services due to a disability, patients feeling comfortable in a different setting for counseling such as school, the need to address fears related to COVID-19).</td>
</tr>
<tr>
<td>CFIR Domains/Process</td>
<td>Constructs: engaging, executing, planning, reflecting and evaluating</td>
<td>Implementation strategies recommended or used by counselors such as the block system (i.e., the counselors set up a 4-hour block per week to provide counseling to address scheduling challenges)</td>
</tr>
<tr>
<td>Client Characteristics</td>
<td>Client- or family-level attitudes or characteristics that may impact client involvement in Friendship Bench.</td>
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</tr>
<tr>
<td>Client Characteristics/Client preferences and attitudes</td>
<td>Discussion about how clients prefer to work with certain counselors and may not want to be referred to someone else. This may also refer to perceptions regarding the Friendship Bench intervention and conversations about the</td>
<td>“When I try to refer him to another counselor he doesn’t want that other counselor. He wants specifically to see me. You see where the problem is.” (A03)</td>
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</table>
## Client Characteristics

### Competing needs

Counselors implying that clients may have competing needs that may prevent the clients from attending counseling sessions such as the need for money and food (e.g., using their transport reimbursement for other things).

> "I had to remind her that in the contract, you are going to be given P30 after I have seen you for that 1 hour. Then within this P30, you can discipline yourself that you… this money is strictly for coming here. If at all I touch it, at least let me have something to come here next week." (A17)

### Dishonesty

Any reference to clients hiding information or not being honest during their sessions such as hiding their emotions (e.g., pretend that they are fine) or lying about a behavior change (e.g., smoking cessation).

> "So our next session, it was kind of awkward… like trying to find out what he really did. So he explained to me that ‘no honestly I did smoke [but] I didn’t mean to.’" (A12)

### Family disapproval

Discussions about clients having a discomfort or fear of disclosing personal information during counseling sessions due to family hesitancy around counseling such as fear of revealing family secrets. This may also refer to parents not allowing clients to come back for counseling or discordant attitudes among parents (i.e., one parent approves while the other does not).

> "The challenge that we encountered most was that parents want to know what you were talking about. You see, that was a problem. So the big challenge was that after they told them, then it was like the parents told them don’t go there again." (A17)

### Reticence or Lack of trust

Discussion regarding clients not feeling comfortable disclosing personal information to their counselors (e.g., not opening up during initial sessions, being quiet or shy, not expressing emotions).

> "The first session I should think is the most difficult because this person doesn’t know whether to trust you or not because [of] how fast the information can travel nowadays… The problem is [when] you start the session." (A11)

## Counselor Characteristics

### Personal characteristics and attitudes of counselors that may impact counselor or client involvement in Friendship Bench.

### Communication style and techniques

Discussions about the counselors’ communication style or techniques used during the counseling sessions. For instance, the counselors try different techniques to make their clients feel comfortable during counseling sessions.

> There was one client that I had a difficult [time] with, uhhh the first and the second sessions she was just [quiet]. So I was like what’s the best way for me to like make her feel comfortable?... So I decided to take just pillows and I asked her like ‘lets just sit down and pretend like you and I are friends’. So I made a
such as icebreakers and creating an informal environment. The communication style of the counselor may ultimately impact the relationship they build with their clients. This may also include problem-solving therapy techniques, as long as it is also coded under "Intervention Characteristics". A conversation with her just… me asking random things.” (A13)

<table>
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<tr>
<th>Counselor Characteristics: Confidence or self-efficacy</th>
<th>The extent to which counselors are confident in their qualifications and level of competence as counselors. For instance, counselors may feel prepared or unprepared to handle certain scenarios during counseling sessions. There may be difficult topics or situations that arise in which counselors do not feel prepared to handle such as rape, suicidal ideation, family issues, or issues around HIV disclosure.</th>
<th>&quot;... even though [the training] was a short period of time I would say I learnt a lot and the fact that even up to now I still use whatever she taught me in my daily life activities is really good…” (A13)</th>
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<tr>
<td>Counselor Characteristics: Counselor perceptions and motivations</td>
<td>The counselors’ perceptions and motivations regarding their participation in Friendship Bench. For instance, many counselors found personal value in participating in Friendship Bench for themselves and for their clients. Some counselors discussed the positive impact that the intervention has on young people and they saw the personal progress in their clients, which in some cases may serve as their motivation for being a counselor.</td>
<td>&quot;...it was very exciting to work with young people such as me because it...it also shows me that all those challenges I go through its not only me. There is someone going through them and... and it’s also exciting because I get to help my peers.” (A11)</td>
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<tr>
<td>Counselor Characteristics: Peer status</td>
<td>Conversations about the counselors’ status as peers or near-peers (i.e., similar age to their clients). This may include discussions about how their peer status makes them relatable to their clients. For instance, some counselors expressed that they are able to understand youth culture, lingo, and social media use since they are in a similar age category</td>
<td>“There is no language barrier because we could communicate anyhow, because we are both youths so they could say whatever they need to say but then it is easy for me to understand. Either they use street language... I can also like get the message from that rather than someone who is older doing that, they won’t really get to know street language and other things that is happening on the youth.” (A18)</td>
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as the adolescents they serve.

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<tr>
<th>Counselor Experiences</th>
<th>Counselor experiences and personal impacts as a result of implementing Friendship Bench.</th>
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<tbody>
<tr>
<td><strong>Counselor Experiences: Emotional burden</strong></td>
<td>Conversations about the counselors feeling emotionally burdened by heavy topics discussed with their clients. This can cover counselors who may have been emotionally triggered by a shared experience with their client such as emotional abuse or were emotionally triggered by a difficult conversation with their client. This can also include how counselors expressed the emotional support they needed (e.g., what they may find helpful). &quot;…You can have a client that is talking about [a] problem that I have experienced so that talking will open up some old wounds on my side and bring some flashbacks and all that.&quot; (A03)</td>
</tr>
<tr>
<td><strong>Counselor Experiences: Navigating hard topics</strong></td>
<td>Refers to counselors who had to navigate hard topics with their clients such as HIV disclosure, family issues, substance use, and sexual abuse. &quot;there was one case in where by one was like they nearly went through a case of being rape or so... yes! So that one was a bit challenging but the fact that it didn’t get to that... my best move... will be to talk Dr Brooks about it and see a way forward of how to help her deal with all the situation because even if I did training [under] Dr Brooks I don’t really have much proper training because that will involve [the] police...&quot; (A13)</td>
</tr>
<tr>
<td><strong>Counselor Experiences: Personal growth and satisfaction</strong></td>
<td>Conversations about how Friendship Bench served as a confidence booster for the counselors or how the intervention gave counselors the ability to help their family and friends. This may also refer to how some counselors experienced positive changes in their character and wellness. &quot;Now I can open up to my family I am still on that process but... it’s a confidence booster for me.&quot; (A13)</td>
</tr>
<tr>
<td>Process of implementation</td>
<td>The way in which the Friendship Bench intervention was delivered including the training sessions, screening of clients, the debrief sessions, the support group</td>
</tr>
<tr>
<td>Process of implementation: Debriefing and support group sessions</td>
<td>Views about the debriefing and support sessions. For instance, some counselors have expressed that the debriefing sessions were not long enough, or that they wish that meals were provided during these sessions. This can also refer to counselors who generally found these sessions helpful and thought that the debrief and support sessions prepared them for counseling sessions with their clients.</td>
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<tr>
<td>Process of implementation: Duration and frequency of sessions</td>
<td>Views about the frequency or duration of the counseling sessions (e.g., sessions were not long enough or too infrequent for clients with complex issues).</td>
</tr>
<tr>
<td>Process of implementation: Location of counseling sessions</td>
<td>Views about the location of the counseling sessions. This may include conversations about how the sessions are not accessible to all clients (e.g., clients with disabilities, clients who live far from Baylor clinic, or clients who have school during sessions). This also includes recommendations to address location issues such as offering sessions in schools or having satellite locations.</td>
</tr>
<tr>
<td>Process of implementation: Recruitment and client load</td>
<td>Views about recruitment and client load. For instance, some counselors thought that clients were not being screened fast enough which was preventing them from seeing more clients. This may also refer to what counselors viewed as the appropriate client load for them (e.g., 3 clients per week). This also refers to counselor suggestions to improve recruitment (e.g., counselors recommending that they screen for clients).</td>
</tr>
<tr>
<td>Process of implementation\Scheduling procedures</td>
<td>Views about client scheduling procedures. For instance, some counselors were in favor of the block system which allowed them to reserve a few hours each week for clients. This also includes conversations about what is or is not helpful regarding the scheduling process (e.g., poor attendance, tardiness). This also includes recommended strategies for improving scheduling and attendance such as hiring full-time workers.</td>
</tr>
<tr>
<td>Process of implementation\Training</td>
<td>Perceptions regarding the quality and usefulness of the training (e.g., too much information in a short time, concerns about retaining information when not seeing clients, conversations about additional training needs, and viewing the training as helpful).</td>
</tr>
<tr>
<td>Resources</td>
<td>Resources that may bolster implementation of the intervention such as financial resources (e.g., compensation and travel reimbursement), material resources, and external resources from other organizations.</td>
</tr>
<tr>
<td>Resources\Compensation and travel expenses</td>
<td>Conversations about the counselors’ level of compensation and reimbursement for travel. For instance, counselors thought that they were not adequately compensated for their work and expressed the need for more money to cover travel expenses.</td>
</tr>
<tr>
<td>Resources\Human resources</td>
<td>Conversations about the degree of or need for support from parents and other individuals outside of the intervention.</td>
</tr>
<tr>
<td>Resources\Material resources</td>
<td>Any mention of tangible resources that will help counselors perform their jobs such as physical space to provide counseling and private offices.</td>
</tr>
<tr>
<td>Societal and Cultural Factors</td>
<td>Societal norms or beliefs and cultural factors pertaining to counseling which may affect a client's participation in Friendship Bench.</td>
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<tr>
<td>Societal and Cultural Factors:Cultural factors related to age</td>
<td>Conversations about how clients may not be able to be themselves if working with an older counselor. This may also refer to how adolescents deal with stress (e.g., substance abuse). Due to social taboos, clients may not feel comfortable talking to older adults about their personal issues such as sex, relationships, and drug use. And older adults may not understand youth culture or &quot;street language.&quot; This may also refer to issues faced by adolescents that older people may not understand, and how to interact with them (e.g., gaining their trust is important to the counselors).</td>
</tr>
<tr>
<td>Societal and Cultural Factors:Societal norms and views</td>
<td>Discussions regarding societal norms and views that may interfere with acceptance of counseling. For instance, parents may not approve of clients receiving counseling as it may be viewed as a social taboo. Counselors also talked about how older people may not think that young people need counseling and may believe that young people do not have anxiety, depression, or substance abuse problems.</td>
</tr>
<tr>
<td>Work Environment and Culture</td>
<td>Coworker relationship dynamics, level of collaboration, and trust.</td>
</tr>
<tr>
<td>Work Environment and Culture:Coworker conflict</td>
<td>The extent to which counselors experience conflict with their peers. This can refer to conflict between counselors which can hinder performance or implementation of the intervention.</td>
</tr>
</tbody>
</table>
### Table 4. Theme Development Matrix

<table>
<thead>
<tr>
<th>CFIR Domain</th>
<th>Emergent Barriers and Facilitators (Deductive and Inductive Constructs)</th>
<th>Illustrative Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outer Setting</strong></td>
<td>The location of the counseling sessions are not ideal for people who live far or in rural areas. (<em>Patient needs and resources</em>)</td>
<td>“What I wish for it’s for us to go out there and…not only the city, even the rural areas they need counseling… the kids there they need counseling, they deserve it also… they don’t get a chance to see something like these maybe just one, day pop about it at any village and pitch our research and talk about these issues you know they will come out and talk to us” (A14)</td>
</tr>
</tbody>
</table>

**Example Quotes:**

- "...some of us we can’t open because we feel when I say something somebody else from the group is going to say it out to some people and then tomorrow I hear it in the clinic…” (A14)

- "...Thursdays usually we meet, we call it family meeting. It is where, as all youth counselors convene… it’s just us now, coming together and then we shared our experiences with how the clients were or maybe I had a difficult client, and then I shared it with them.” (A17)

- "[Our boss] is trying her best to try to... to try to uh...like try to solve that problem..." (A11); "The support sessions, they are very good in a way that, that’s where you voice out your concerns relating to the work that you are doing. If at all you are not satisfied with the stipend that it is little, yes that is the time to say that ‘the stipend does not accommodate me, the money gets depleted on transport.’" (A18)
“but they don’t really have a problem coming here besides the only hiccup they have is transport, because some come as far as Mochudi, Ramotswa, Tlokweng…” (A18)

“[Clients who live far] affects because some come-some can be late…some come late… They stay away in Molepolole…in Mochudi, so they use public transport mostly.” (A18)

<table>
<thead>
<tr>
<th>Characteristics of Individuals</th>
<th>Parental disapproval of the intervention</th>
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</thead>
<tbody>
<tr>
<td>: Challenges we had was getting them to open up. And also… having to ask them to come because we had this..uhm..client confidentiality, but then the challenge that we encountered most was that parents want to know what you were talking about. You see, that was a problem. So the big challenge was that after they told them, then it was like the parents told them don’t go there again.” (A17)</td>
<td></td>
</tr>
<tr>
<td>“Before they come for counseling… one needs parental consent… so the other parent will agree and the other one will not agree.” (A14)</td>
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</tr>
<tr>
<td>So that’s the most challenging part. For them to talk to us, the thing is like, I don’t know how to put it. The thing is, when a kid… normally in our society when a kid, lets say someone is…when a kid says is going to see a Counselor, to our parents its like we are going to reveal family secrets. The thing is; That’s how it is… Lets say maybe the child is being bullied at home, is being er…abused and what, that process of them going to see a counselor even the parents will be on edge that this child may…may expose us yah! So that kind of…of environment will cause that child to…to not say anything willingly. They just avoid most of the questions and answer them with short ended…short ended…ended questions to avoid er…revealing more information.” (A3)</td>
<td></td>
</tr>
<tr>
<td>“‘Why my child needs counseling.’ Parents don’t intend to understand the importance of counseling… some parents are not open to us, they will say no she is fine while [when they are] going through a lot… Then [they] can’t tell [their] mum what [they] are going through so it’s best [if they] go tell somebody…” (A14)</td>
<td></td>
</tr>
<tr>
<td>“Counseling sessions currently, its-it’s not enough because we are not seeing clients currently, because of Covid-19 issues and yeah also the protocols aren’t allowing and also like the clients they are just scared… just as everyone is scared, imagine now contracting Corona when I had went for counseling… Imagine a parent hearing that I contracted corona when I went for counseling, in which its one of the challenges that when it comes to parents, some they don’t really like encourage their children to come see us.” (A18)</td>
<td></td>
</tr>
<tr>
<td>“Me personally I just, I just keep on reminding youth… these youth that er… Since we us grew up in a…a society where we don’t usually shared our…our feeling, well our parents are not those kind of people were, they believe er…er…a child can be depressed, er…can have anxiety, can have this other problems because they think they are for older people only… They don’t believe the youth can have those problems.” (A3)</td>
<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th>Inner Setting</th>
<th>Counselors do not have enough money for transportation to the intervention site (Available Resources)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“I would like to say the…the capital. I know… I know its…its a voluntary work but uh in terms of transport, in terms of transport I feel like er…er it is not enough and is… I think if…if…if…If they increased the…the…the the rate we get a day, it would be much better because right now we are getting is it 70…? P70.00 a day…a day and we come twice in a week and the…the other day we don’t get P70.00 but we get P50.00.” (A11)</td>
<td></td>
</tr>
<tr>
<td>“R: Right now we are getting P480. That was before the price increase of combis. Of which we did mention to our supervisor but she is… it didn’t change. You see?” (A17)</td>
<td></td>
</tr>
<tr>
<td>“Imagine if I get a call like now to come here…this side, its gonna take me a long time, its gonna need money also. What if at that certain time I don’t have any money with me.” (A3)</td>
<td></td>
</tr>
</tbody>
</table>
| “Basically money, money is a problem… because er normally we bring…You know we have to get here… Like I said sometimes they will just pop up out from no where… I came to see my…my
counselor and the counselor, like me I stay in Ramotswa... Imagine if I get a call like now to come here...this side, its gonna take me a long time, its gonna need money also. What if at that certain time I don't have any money with me... You see that's the kind of problem that we face.” (A3)

“The problem that we as counsellors we are complaining about is the money that we get... The money that we get is not even enough to support our own selves... Because as we've noticed transport went...transport fairs went up. The thing is a lot of things are expensive... Even for us just to wake up and come here when you know that... that's, that's a cost from your pocket. The money that you are going to get is not going to cover the amount of expenses that you are using to come and go back... That the other problem that we are facing... Most us because some of the counsellors end up not pitching.” (A3)

<table>
<thead>
<tr>
<th>Characteristics of Individuals</th>
<th>Clients usually do not open up during initial counseling sessions, usually due to lack of trust (Knowledge and Beliefs, Other Personal Attributes)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>“If a client doesn’t trust me, he holds back some information…” (A11)</td>
</tr>
<tr>
<td></td>
<td>“For me personally first sessions were always difficult across all the clients I had... even for others, for other lay counselors it is always difficult first like-first sessions, second session, third session, fourth session and fifth session is always smooth” (A18)</td>
</tr>
<tr>
<td></td>
<td>“they are af...they don’t easily open up to...to really talk about what they are going through.” (A3)</td>
</tr>
<tr>
<td></td>
<td>“The most difficult thing is getting somebody to really talk about their...their...their pain that they are going through... Like sharing their pain. What I would really...what really going on with...within their lives. That's the most difficult part because during that process you are like opening up old wounds.” (A3)</td>
</tr>
<tr>
<td></td>
<td>“Umm I will mention one of them, repeated sessions are once, okay from experience, I once had a client who never really said anything. That is who wasn’t really opening up, across all repeated sessions and we then ended sessions just like that, we didn’t cover much though he had some...though he had a few list of things that should we-but then there were like 4 or 5 problems and then some of them we didn’t go over them” (A17)</td>
</tr>
<tr>
<td></td>
<td>“....they would see clients for the first session and then you will never hear from the clients again... they come with excuses and stuff... I: Oh okay maybe they-they were not warmed up to the counselor to open up. R: Yeah” (A12)</td>
</tr>
<tr>
<td></td>
<td>“The most difficult thing... the first session I should think is the most difficult because this person doesn’t know whether to trust you or not because of how fast the information can travel nowadays. So it’s a very difficult thing but as time goes, as the client [begins] to trust you it’s fine. The problem is when you start the session.” (A11)</td>
</tr>
<tr>
<td></td>
<td>“The advice was that we asked that we hold our sessions outside Baylor so that clients could feel free. Because clients may feel like when we are with them in sessions we are going to tell the Doctors', because here it’s just one family... They are going to feel that we are going to tell the Doctors’ how they live and what they say-what they say, though you have told them whatever we do-we talk about is confidential... The part that here they are not comfortable around them it’s that which causes clients to runaway most of the time without completing sessions, others not totally being honest on the whole thing when they are doing surveys so that they can pass and the person will not have to come here but then some-one client can tell you that “aaah, it will be more easier if we were somewhere else maybe at main mall or in a park”. You see?” (A18)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characteristics of individuals</th>
<th>Counselors are emotionally triggered when they experience the same hardships as their clients (Other Personal Attributes)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>“…You can have a client that is talking about [a] problem that I have experienced so that talking will open up some old wounds on my side and bring some flashbacks and all that” (A03)</td>
</tr>
</tbody>
</table>
|                               | “It doesn’t help anybody. So, the most important thing as I told you that you can have a client that is talking about er...problem that I have experienced so that talking will open up some old
wounds on my side and bring some flashbacks and all that… So, that will cause… will stress me myself.” (A03) 
"sometimes you can have you may find where a client brings up a problem there that we face there but you have once faced it but then depending on your emotions on the time if they are too heavy for you….you have to find a way of not showing your client physically but say “can I please go and drink water…. Or to even a point of changing umm the counselors, I could just tell my client I cannot deal with you for the reasons that I have which I will discuss with my supervisors and we are going to have someone new as a counselor but similar age, same thing whom will address you for the whole entire remaining sessions.” (A18) 
“that is why I am saying we were taught all aspects that if things are like this you see, have to do one, two and three. And also the other issue in counseling, we have also our own separate counseling so that me too as a counselor I have someone that I am seeing that I am hoping to tell my problems regarding some certain issues that I am experiencing personal, either with my clients or my personal life.” (A18) 
“Honestly um I’ve gone through what the client was going through so its more of like what she went through is like I put it…how do I put it into words…its like I had to pretend like I wasn’t going through what she is going through so for me to help them I had to like suppress my emotions.” (A13) 
"R: Yes! [I] am a person with emotions some they come with heavy issues and then I have to, i am a person I react but then they don’t have to see that I react I can make an excuse to go drink water but knowing personally that this issue hurts. Because some can bring personal problems that you once had in the past or that you are currently facing you see, that is why i am saying we were taught all aspects that if things are like this you see, have to do one, two and three. And also the other issue in counseling, we have also our own separate counseling so that me too as a counselor I have someone that I am seeing that I am hoping to tell my problems regarding some certain issues that I am experiencing personal, either with my clients or my personal life.” (A18) 
“sometimes you can have you may find where a client brings up a problem there that we face there but you have once faced it but then depending on your emotions on the time if they are too heavy for you….you have to find a way of not showing your client physically but say ‘can I please go and drink water’….Or to even a point of changing umm the counselors, I could just tell my client I cannot deal with you for the reasons that I have which I will discuss with my supervisors and we are going to have someone new as a counselor but similar age, same thing whom will address you for the whole entire remaining sessions.” (A18) 
“you can meet a client… Who-who says something that will remind you of your own problems..” (A12) 
“Uuuh for the triggering we are usually advised that, if you are brought with a case that is close to home, then refer to like either your colleagues or tell the supervisor or even tell the boss and they will refer to someone else you see? But for like I always told this in my initial training that... ‘that yeah… you have to understand that when you have cases that are close to home, when you have cases that hit close to home, sometimes it can happen that, you be the best person to help the client’ you see?. So like that’s the only reason why I didn’t refer it, or like I don’t refer cases even when they feel like “eish I know a person that has went through this or like eish I have also dealt with this, or like my brother is going through this” so like I try my best to still be objective and still find -help the clients find solutions.” (A20)
there was this excuse that they didn’t have money, which was actually very funny for us because every time after we see them we gave them transport money…” (A17)

“It has now the problem being the clients...the liability of the clients. The clients are not showing up or there are no clients at all.” (A11)

“The challenge is always like coming here and also rescheduling issues because its-it happens, because there are issues of whether other commitments either from me or my client… of course because maybe I will come here knowing my client will be here at 2 o’clock and then at half past 2 they will be telling me no I have family issues… and then we reschedule to a different date which accommodate my client with me now, and I have to make sacrifices for my client because I understand it’s one of the things that we were told about. That sometimes you are going to have difficulties that you are going to invade some of the personal, private time.” (A18)

“Then you have to come. Sometimes you appoint with they don’t show up… They don’t show up.” (A3)

“…sometimes [the clients] will just pop up out from no where. I came to see my...my counselor and the counselor, like me I stay in Ramotswa... Imagine if I get a call like now to come here...this side, its gonna take me a long time, its gonna need money also. What if at that certain time I don’t have any money with me.” (A3)

“[The schedule] never benefited me at all… Basically they...because we work, they...they come at their own time… They can just come any day and be like “I want to see this guy” and I will be forced to come from home to come see him.” (A3)

“It wasn’t working . It doesn’t work for us. Even when you book a specific date, that okay! Lets say we meet tomorrow on Friday around 3. she will be like “Okay! No problem” then tomorrow they doesn’t pitch. They will pitch lets say on Monday they will be like “ I am here looking for you” and you will be like me I am not there then you are forced to come.” (A3)

“.because uh... I was talking about time, there is a problem of time management between us and uh the...the clients. Because at first when we started the program we used to like...we used to be called on hold...well, call on hold if you understand. Uh! Where a client will come then you will be called to come at a certain time so that you can meet up with this client. For example; if...if a client...if we decided that we should meet with the client around one, then the client decides to come around two... Its a problem because I do have other commitments outside there. So waiting an hour for a client...is...its a problem.” (A11)

“Recently, okay! Let me see say this, since March we haven’t had clients. Okay! I haven’t had a single client but before the scheduling was okay after they...they introduced the Blocks but before...before the Blocks it was...it was a problem because sometimes you could agree with a client to meet around 2pm and you, you would know that 2pm you have to be here but the client is not here around 2.” (A11)
Table 5. Determinants of the adapted Friendship Bench model and related CFIR domains and constructs

<table>
<thead>
<tr>
<th>Barriers</th>
<th>CFIR Domain</th>
<th>CFIR Construct</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Client Reticence and Confidentiality Concerns:</strong> During initial sessions, clients may be reluctant to confide in the counselors due to initial lack of trust or confidentiality concerns.</td>
<td>Characteristics of Individuals</td>
<td>Knowledge and Beliefs about the Intervention</td>
</tr>
<tr>
<td><strong>Parental Disapproval:</strong> Parents do not approve of client participation in Friendship Bench which may partially be explained by cultural views and stigmas around counseling.</td>
<td>Outer Setting</td>
<td></td>
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<tr>
<td><strong>Client Accessibility:</strong> The location for Friendship Bench implementation is not suitable for clients who have disabilities or live far, and for clients who need counseling during school hours.</td>
<td>Outer Setting</td>
<td>Patient Needs and Resources</td>
</tr>
<tr>
<td><strong>Scheduling Procedures:</strong> Scheduling by appointment is inconvenient for counselors because clients often attend their appointments late or miss their appointments completely.</td>
<td>Process</td>
<td>Executing</td>
</tr>
<tr>
<td><strong>Lack of Financial Resources:</strong> Counselors have limited financial resources to carry out their work and meet their personal needs.</td>
<td>Inner Setting</td>
<td>Available Resources</td>
</tr>
<tr>
<td><strong>Counselor Psychological Wellbeing:</strong> Counselors experience the same hardships as their clients which makes it difficult for them to continue with counseling sessions.</td>
<td>Characteristics of Individuals</td>
<td>Other Personal Attributes</td>
</tr>
<tr>
<td><strong>Facilitators</strong></td>
<td>Intervention</td>
<td>Relative Advantage</td>
</tr>
<tr>
<td><strong>Peer Delivery of Counseling:</strong> Friendship Bench implementation by peer counselors is more advantageous than conventional counseling provided by older adults due to age-related cultural similarities between the peer counselors and clients.</td>
<td>Intervention Characteristics</td>
<td></td>
</tr>
<tr>
<td><strong>Counselor Perceived Value of the Intervention:</strong> Counselors value Friendship Bench because they understand the benefits of their participation for their clients and for themselves.</td>
<td>Characteristics of Individuals</td>
<td>Knowledge and Beliefs about the Intervention</td>
</tr>
</tbody>
</table>

Table 6. Behavioral Prompts

<table>
<thead>
<tr>
<th>Decision Step Prompts</th>
<th>Action Step Prompts</th>
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</thead>
<tbody>
<tr>
<td><strong>Cues</strong></td>
<td>What prompts the person to make a decision or plan?</td>
</tr>
<tr>
<td></td>
<td>What prompts the person to act?</td>
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<tr>
<td></td>
<td>How explicit are cues to make a choice?</td>
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<tr>
<td></td>
<td>Do cues to act come at the right time?</td>
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<tr>
<td></td>
<td>How do different choices cue or prompt differently?</td>
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<tr>
<td></td>
<td>Who else is around when a choice is being made?</td>
</tr>
<tr>
<td></td>
<td>How salient are the cues to act?</td>
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<tr>
<td></td>
<td>Does the person know when it is time to act?</td>
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<tr>
<td></td>
<td>Does the person know what others are doing?</td>
</tr>
<tr>
<td></td>
<td>Who else is around when it's time to engage in the target behavior?</td>
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<tr>
<td></td>
<td>How easily can an intention or plan or decision be translated into behavior?</td>
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</table>
How quickly can an intention or plan or decision be translated into behavior?  
Is the action aligned in time with the moment of greatest intention?  
How long ago was the decision made?  
Can the action only happen at a certain time or in a certain order?

<table>
<thead>
<tr>
<th>Alternatives</th>
<th>What is the choice set the person is facing?</th>
<th>How easy is it to forget or avoid the behavior?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>How clear or obvious is the content of the choice set?</td>
<td>How easy is it to postpone or procrastinate in the moment?</td>
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<tr>
<td></td>
<td>How large or numerous is the choice set?</td>
<td>Does the person change their mind in the moment?</td>
</tr>
<tr>
<td></td>
<td>How easy or obvious (vs. effortful, hard) is it to identify the choice set?</td>
<td>What other actions are more attractive, tempting, or salient in the moment?</td>
</tr>
<tr>
<td></td>
<td>How easy or obvious (vs. effortful, hard) is it to evaluate the choices?</td>
<td>How fragile or breakable is a previous plan or commitment?</td>
</tr>
<tr>
<td></td>
<td>When do choices present themselves?</td>
<td>How easy is it to fall off a behavioral cascade?</td>
</tr>
<tr>
<td></td>
<td>Is the person thinking about the choice set the same way the researcher is?</td>
<td>How easy is it get back on track once off the cascade?</td>
</tr>
<tr>
<td></td>
<td>Which choices are likely to be most obvious, salient, or top-of-mind?</td>
<td>How is the person weighing different options over time (now vs. later)?</td>
</tr>
<tr>
<td></td>
<td>How is the person evaluating the choices?</td>
<td>Does the behavior feel uncomfortable or painful such that it is avoided?</td>
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<thead>
<tr>
<th>Meanings</th>
<th>Does making a choice or a plan feel uncomfortable or painful?</th>
<th>What does it mean to make a choice or plan about this behavior?</th>
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<tbody>
<tr>
<td></td>
<td>What does it mean to make a choice or plan about this behavior?</td>
<td>What does it mean to take this action?</td>
</tr>
<tr>
<td></td>
<td>What identities are associated with this decision?</td>
<td>What identities are associated with this behavior?</td>
</tr>
<tr>
<td></td>
<td>What are the mental models or lay understandings about this choice?</td>
<td>How much feedback does the person get about the behavior?</td>
</tr>
<tr>
<td></td>
<td>Does this choice or decision or plan affect the person’s social, economic role?</td>
<td>What does it mean to break an earlier commitment or plan?</td>
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<tr>
<td></td>
<td>Are some options more endorsed or normative in the person’s peer group?</td>
<td>What are to perceived consequences of failing to act?</td>
</tr>
<tr>
<td></td>
<td>Is the choice being promoted by someone the person trusts?</td>
<td>Is the action thought of as a series of sub-actions?</td>
</tr>
<tr>
<td></td>
<td>Does the person pay attention to some choices more than others?</td>
<td>Does the person have a realistic sense of how much time the action takes?</td>
</tr>
<tr>
<td></td>
<td>How familiar is the person with the behavior?</td>
<td>How well can the person infer likely success of the behavior?</td>
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<table>
<thead>
<tr>
<th>EAST Framework Construct</th>
<th>Prototype Example</th>
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</thead>
<tbody>
<tr>
<td><strong>Make it Easy</strong></td>
<td>Make the target behavior a default option. A default is an involuntary choice obtained by a chooser. An example of an existing prototype is providing ART refills during Teen Club meetings. Adolescents receive refills by default due to their attendance in Teen Club rather than actively</td>
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scheduling refill visits during clinical appointments. Another example is having ART refills mailed to patients monthly by default to minimize hassle factors (e.g., monthly refill pickup in clinic).

<table>
<thead>
<tr>
<th>Make it Attractive</th>
<th>Create rewards for engaging in the target behavior (i.e., ART adherence) such as lotteries or incentives.</th>
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<tbody>
<tr>
<td>Make it Social</td>
<td>Motivate people to hold themselves accountable to acting on the target behavior through commitment devices. An example of a commitment device is scheduling a time each day to take ART medications with a seropositive peer.</td>
</tr>
<tr>
<td>Make it Timely</td>
<td>Encourage performance of the target behavior at desirable times. The behavioral science literature confirms that individual moods and priorities can be affected by temporal factors. For, example, adolescents can be encouraged by expert clients to take ART while doing a desirable activity such as eating and playing soccer, which is a habit-forming intervention.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hypothesized Behavioral Barrier</th>
<th>Behavioral Prompts (Cues, Alternatives, or Meanings)</th>
<th>Behavioral Economics Construct(s)</th>
<th>Illustrative Quote from Contextual Inquiry Data (i.e., Expert Client Interview Transcripts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barrier # 1: Adolescents may avoid taking ART medication due to anger, shame, or lack of acceptance related to dishonesty and delayed disclosure among parents.</td>
<td>Meaning: Does doing the behavior feel uncomfortable or painful such that it is avoided? Is the choice being promoted by someone the person trusts?</td>
<td>Reactive Devaluation, Affect Heuristic, Ostrich Effect</td>
<td>“…being late with disclosure causes the child to alienate the parent. The child then begins to have trust issues with the parent…” (female expert client, 42 years old)</td>
</tr>
<tr>
<td>Barrier # 2: Adolescents who are living in poverty lack food and clothing which can interfere with their ART adherence because they are focused on meeting their immediate needs.</td>
<td>Alternatives: What is the choice set the person is facing? Which choices are likely to be most obvious, salient, or top-of-mind?</td>
<td>Psychology of Scarcity</td>
<td>“…some of the adolescents are underprivileged… some of them do not have much at home, and it makes it difficult to take their medication” (female expert client, 43 years old)</td>
</tr>
<tr>
<td>Barrier # 3: Adolescents may not want to take ART out of fear of undesirable side effects.</td>
<td>Meanings: What are the mental models or lay understandings about this choice?</td>
<td>Hot-Cold Empathy Gap, Negativity Bias, Mental Models</td>
<td>“It is mainly poor adherence [and] when you sit and have a chat with them about it, they tell you that food is scarce at home, so they are scared to take the medication” (male expert client, 40 years old)</td>
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</tbody>
</table>

Table 8. Validated hypothesized barriers to antiretroviral therapy adherence among Swazi adolescents
<table>
<thead>
<tr>
<th>Behavioral Economics Concept</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>Affect heuristic</td>
<td>A cognitive shortcut in which an emotional state can lead to impulsive decision-making (409).</td>
</tr>
<tr>
<td>Commitment device</td>
<td>A means of &quot;locking yourself&quot; into a course of action such as a commitment contract (410).</td>
</tr>
<tr>
<td>Framing effect</td>
<td>Our decisions can be influenced by the way information is presented. Two messages that are equivalent but presented differently can differ in attractiveness. For instance, yogurt with the label &quot;80% fat free&quot; may be more attractive to consumers than the label &quot;contains 20% fat.&quot; The idea of gain and loss framing stems from the prospect theory whereby a loss has a greater impact on choice decisions than a gain of an equivalent amount (411, 412).</td>
</tr>
<tr>
<td>In-group bias</td>
<td>A term, also known as in-group favoritism, rooted in identity economics which refers to the human tendency to give preferential treatment to a group we identify with (413).</td>
</tr>
<tr>
<td>Hot-cold empathy gap</td>
<td>The human tendency to underestimate our behavior during intense emotional or visceral states (414). While we are in &quot;cold&quot; states, we underestimate how &quot;hot&quot; or visceral states (i.e., hunger, fatigue, anger) affect our choices, behaviors, and attitudes. We tend to act more logically during &quot;cold&quot; states because they are uninfluenced by our emotions or visceral feelings.</td>
</tr>
<tr>
<td>Hyperbolic discounting</td>
<td>The human inclination to prefer immediate rewards over future ones (415, 416). Hyperbolic discounting occurs in the context of a larger phenomenon of delay discounting.</td>
</tr>
<tr>
<td>Term</td>
<td>Description</td>
</tr>
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<td>------</td>
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<tr>
<td>Implementation prompts</td>
<td>Implementation prompts provide a concrete and specified plan that increases the likelihood of acting on good intentions (417). They also provide specificity and a practical plan for acting on the intended behavior. Intentions are more effective when plans are stated and when implementation plans are specific and accounts for overcoming potential obstacles (361).</td>
</tr>
<tr>
<td>Incentivization</td>
<td>Based on classical psychological theory, incentivization occurs when behavior is reinforced as a result of positive outcomes (418).</td>
</tr>
<tr>
<td>Loss aversion</td>
<td>A human tendency to be adversely affected by a loss more than acquiring a gain of an equivalent value (419). For instance, losing $100 is less preferred over gaining $100. According to prospect theory, losses are twice as powerful than equivalent gains (419).</td>
</tr>
<tr>
<td>Mental models</td>
<td>A cognitive construct referring to individual reasoning and internal representations of reality, including ingrained ideas and worldviews, which inform decision-making (420, 421).</td>
</tr>
<tr>
<td>Messenger effect</td>
<td>Also known as “source effects” or “communicator effects,” the messenger effect is the notion that the weight we place on information is determined by the messenger source (335, 422-425).</td>
</tr>
<tr>
<td>Negativity bias</td>
<td>Negative experiences have a greater psychological impact than positive ones, which is linked to loss aversion (426). Refer to loss aversion definition.</td>
</tr>
<tr>
<td>Ostrich effect</td>
<td>The act of avoiding negative feedback or information, which is comparable to an ostrich who buries its head in the sand (427).</td>
</tr>
<tr>
<td>Overconfidence bias</td>
<td>The tendency to overestimate our actual abilities (428).</td>
</tr>
<tr>
<td>Precommitment</td>
<td>A strategy used to ensure that we reach our desired goals (429).</td>
</tr>
<tr>
<td>Psychological reactance</td>
<td>An unpleasant reaction to instruction or proposals perceived to be a threat to one’s freedom (430, 431).</td>
</tr>
<tr>
<td>Psychology of scarcity (or scarcity mindset)</td>
<td>The idea that having limited resources can prompt myopic, trade-off thinking whereby our mind is set on meeting urgent immediate needs at the expense of other important needs of the future (343). Scarcity, whether scarce in terms of time, food, or social support, draws our attention to addressing the need for the scarce resource by prioritization and deferring other pertinent goals (343).</td>
</tr>
<tr>
<td>Reactive devaluation</td>
<td>The tendency to disregard or devalue instructions or proposals due to negative thoughts or antagonistic feelings towards the person or party making the proposal (432).</td>
</tr>
<tr>
<td>Reciprocity</td>
<td>A social norm of performing a positive action in exchange for a positive reward or altruistic action received (433-435).</td>
</tr>
<tr>
<td>Reference dependence</td>
<td>A principle of prospect theory referring to the human tendency to make decisions based on a reference point or the status quo (419).</td>
</tr>
<tr>
<td>Regret aversion</td>
<td>The idea that choices are made to avoid a negative outcome (419). Also informed by the prospect theory which states that people are more sensitive to the adverse effects of to negative experience than to pleasant positive experiences.</td>
</tr>
<tr>
<td>Representativeness heuristic</td>
<td>A cognitive shortcut whereby people use a representative exemplar or prototype to predict the likelihood of an event, which explains stereotyping (436).</td>
</tr>
</tbody>
</table>
The idea that peer comparison motivates behavior change (318), which is linked to reference dependence bias (see reference dependence definition). We are motivated to improve our performance once we observe our peers performing better than us (318).

Informal guidelines for acceptable behavior (437). Social norms can be injunctive (behavior that is expected) or descriptive (behavior that people actually do) (438). Social norms can even predict intentions when the behavior is witnessable by others (438).

The idea that we overestimate the amount of attention placed on us due to egocentric biases (overreliance on our own perspectives) and illusion of transparency (the human tendency to believe that others can discern our thoughts or feelings) (439, 440).

Preconceived judgements or notions that are generally ascribed to a particular group, based on a behavioral science theory that people make judgements based on representativeness theory (436). Refer to representativeness heuristic.

<table>
<thead>
<tr>
<th>Hypothesized Barrier</th>
<th>Behavioral Construct</th>
<th>Regret Lotteries</th>
<th>Message Framing</th>
<th>Messenger Effect</th>
<th>Commitment Contracts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barrier # 1: Adolescents may avoid taking ART medication due to anger, shame, or lack of acceptance related to dishonesty and delayed disclosure among parents.</td>
<td>Ostrich Effect</td>
<td></td>
<td></td>
<td></td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>Reactive Devaluation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Affect Heuristic</td>
<td></td>
<td></td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Barrier # 2: Adolescents who are living in poverty lack food and clothing which can interfere with their ART adherence because they are focused on meeting their immediate needs.</td>
<td>Psychology of Scarcity</td>
<td>√</td>
<td></td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Barrier # 3: Adolescents may not want to take ART out of fear of undesirable side effects.</td>
<td>Hot-Cold Empathy Gap</td>
<td></td>
<td></td>
<td></td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>Negativity Bias</td>
<td>√</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mental Models</td>
<td>√</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barrier # 4: Adolescents fear public and interpersonal disclosure of their HIV status.</td>
<td>Spotlight Effect</td>
<td></td>
<td></td>
<td></td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>Representative Heuristic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stereotypes</td>
<td>√</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barrier # 5: When adolescents reach puberty, they begin to rebel and refuse taking ART against advice from adults.</td>
<td>Psychological Reactance</td>
<td></td>
<td></td>
<td></td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>Social Norms</td>
<td></td>
<td></td>
<td></td>
<td>√</td>
</tr>
</tbody>
</table>
Figure 1. The lay workforce in Eswatini and their role in the HIV response

**Expert Clients**
- Lay persons living with HIV who provide HIV peer support services such as ART adherence counseling

**Mentor Mothers**
- Mothers living with HIV who provide peer support to other mothers living with HIV by promoting PMTCT

**Lay Counselors**
- Lay clinical staff who provide HIV testing and counseling to newly diagnosed HIV patients

Figure 2. PRISMA Flow Diagram

- **Identification**
  - Records identified through database searching of CINAHL, Embase, and PubMed (n=4193)
  - Additional records identified through other sources (n=0)

- **Screening**
  - Records after duplicates removed (n=3217)

- **Eligibility**
  - Records screened by title and abstract (n=3217)
  - Records excluded (n=3094)

- **Included**
  - Full-text articles assessed for eligibility (n=123)
  - Articles included based on bibliographic search of similar reviews (n=2)
  - Full-text articles excluded (n=106)

- Studies included in synthesis (n=19)
Figure 3. Depiction of Friendship Bench Adaptation in Botswana

Adaptable Periphery
- Age of lay counselors (adolescents and young adults)
- Modality of clinical supervision (physicians and mental health professionals)
- Support structure type (post-counseling sessions for counselors only)

Core Components
- Six problem-solving therapy sessions
- Protocolized problem-solving therapy training
- Lay counselors
- Clinical supervision
- Support structure

Figure 4. Consolidated Framework for Implementation Research (CFIR) Framework

**Outer Setting**
- Patient Needs and Resources
- Cosmopolitanism, Peer Pressure
- External Policies and Incentives

**Inner Setting**
- Structural Characteristics
- Networks and Communications
- Culture, Implementation Climate
- Readiness for Implementation

**Characteristics of Individuals**
- Knowledge and Beliefs about the Intervention, Self-efficacy
- Individual Stage of Change, Individual Identification with Organization, Other Personal Attributes

**Process**
- Planning, Engaging, Executing, Reflecting and Evaluating

**Intervention Characteristics**
- Intervention Source, Evidence Strength and Quality, Relative Advantage, Adaptability, Trialability, Complexity, Design Quality and Packaging, Cost
Figure 5. A visual depiction of the relationship between codes, categories, and themes

Figure 6. Diagrammatic representation of the stages of Fereday and Muir-Cochrane’s (2006) hybrid thematic analysis approach (modified)

| Stage 1: Developing the code manual |
| Stage 2: Summarizing data and identifying initial themes |
| Stage 3: Applying template of codes and additional coding |
| Stage 4: Testing the reliability of codes |
| Stage 5: Connecting the codes and identifying themes |
| Stage 6: Corroborating and legitimating coded themes |
Figure 7. Diagrammatic depiction of cues, alternatives, and meanings of action and decision steps using adherence to antiretroviral therapy as an example

<table>
<thead>
<tr>
<th>Decision Step</th>
<th>Action Step</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan to adhere to antiretroviral therapy</td>
<td>Adhere to antiretroviral therapy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Decision Step Cues</th>
<th>Action Step Cues</th>
</tr>
</thead>
<tbody>
<tr>
<td>What prompts the person to make a decision to take ART?</td>
<td>How does the environment cue or fail to cue the person to take ART?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Decision Step Alternatives</th>
<th>Action Step Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the choice set the person is facing regarding ART adherence?</td>
<td>How easy is it to forget or avoid taking ART?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Decision Step Meanings</th>
<th>Action Step Meanings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does making the decision to take ART feel uncomfortable or painful?</td>
<td>What identities are associated with taking ART?</td>
</tr>
</tbody>
</table>
Figure 8. Flowchart of the NUDGE process and results

**PROCESS**

**N** Narrow the focus to a specific target behavior

**U** Understand the context of the behavior through inquiry

**D** Discover insights about the target behavior by hypothesizing barriers rooted in behavioral economics constructs (e.g., cognitive biases and heuristic thinking)

- **Step 1:** Formulate hypotheses about behavioral barriers to the target behavior through structured brainstorming that links the contextual understanding to known cognitive biases and heuristics
- **Step 2:** De-duplicate and synthesize hypothesized barriers
- **Step 3:** Rapidly validate hypothesized barriers through expert consultation, literature review, member checking

**G** Generate intervention strategies and designs that directly address behavioral barriers

**E** Evaluate intervention designs in iterative pilots.

**RESULTS**

- Antiretroviral therapy adherence among adolescents
- 20 semi-structured interviews with expert clients
- 122 initial hypothesized barriers
- 82 de-duplicated barriers
- 22 synthesized barriers refined to 13 by expert clients
- 5 barriers validated and prioritized by expert clients
- 4 intervention prototypes vetted by expert clients
APPENDIX C: SEARCH STRATEGY

PubMed


AND


AND


AND


AND


149
Embase

1. ('human immunodeficiency virus infection'/exp OR 'acquired immune deficiency syndrome'/exp OR 'HIV':ti,ab,kw OR 'AIDS':ti,ab,kw OR 'antiretroviral therapy':ti OR 'antiretroviral therapy'/exp OR 'anti-retroviral agents':ti,ab,kw OR 'anti HIV agents':ti,ab,kw OR 'highly active antiretroviral therapy':ti,ab,kw OR 'ART':ti OR 'ARV*':ti OR 'antiretroviral*':ti OR 'anti-retroviral*':ti OR 'HAART':ti OR 'cART':ti)

AND

2. ('retention in care':ti OR 'follow up':ti OR 'follow-up':ti OR 'loss-to-follow-up':ti OR 'loss to retention':ti OR 'lost to retention':ti OR 'treatment initiation':ti OR 'treatment failure':ti OR 'virologic failure':ti OR 'viral failure':ti OR 'retention':ti OR 'retain*':ti OR 'attrition':ti OR 'viral suppression':ti OR 'virological suppression':ti OR 'virologic suppression':ti OR 'patient compliance'/exp OR adhere*:ti)

AND

3. ('young adult'/exp OR 'adolescent'/exp OR 'young adult':ti,ab,kw OR 'adolescent':ti,ab,kw OR 'teen':ti,ab,kw OR 'youth':ti,ab,kw OR 'young':ti,ab,kw OR 'child':ti,ab,kw OR 'paediatric':ti,ab,kw OR 'pediatric':ti,ab,kw)

AND

4. ('health services'/exp OR 'health care quality'/exp OR 'HIV care' OR 'care':ti OR 'quality of care':ti OR 'health care':ti OR 'healthcare':ti OR 'health':ti OR 'health services':ti OR 'healthcare services':ti OR 'health service':ti OR 'adolescent care':ti OR 'adolescent health':ti OR 'adolescent healthcare':ti OR 'adolescent health care':ti OR 'Clinical Study'/exp OR 'intervention*':ti OR 'clinical trial':ti OR 'trial':ti OR 'controlled trial':ti OR 'randomized controlled trial':ti OR 'RCT':ti)

AND

5. ('sub-Saharan Africa':ti,ab,kw OR 'sub-saharan Africa':ti,ab,kw OR 'Angola':ti,ab,kw OR 'Benin':ti,ab,kw OR 'Botswana':ti,ab,kw OR 'Burundi':ti,ab,kw OR 'Cameroon':ti,ab,kw OR 'Cape Verde':ti,ab,kw OR 'Central African Republic':ti,ab,kw OR 'Chad':ti,ab,kw OR 'Comoros':ti,ab,kw OR 'Djibouti':ti,ab,kw OR 'Guinea':ti,ab,kw OR 'Eritrea':ti,ab,kw OR 'Ethiopia':ti,ab,kw OR 'Gabon':ti,ab,kw OR 'Gambia':ti,ab,kw OR 'Ghana':ti,ab,kw OR 'Guinea':ti,ab,kw OR 'Guinea-Bissau':ti,ab,kw OR 'Kenya':ti,ab,kw OR 'Lesotho':ti,ab,kw OR 'Liberia':ti,ab,kw OR 'Madagascar':ti,ab,kw OR 'Malawi':ti,ab,kw OR 'Mali':ti,ab,kw OR 'Mauritania':ti,ab,kw OR 'Mauritius':ti,ab,kw OR 'Mozambique':ti,ab,kw OR 'Namibia':ti,ab,kw OR 'Niger':ti,ab,kw OR 'Nigeria':ti,ab,kw OR 'Reunion':ti,ab,kw OR 'Rwanda':ti,ab,kw OR 'Senegal':ti,ab,kw OR 'Seychelles':ti,ab,kw OR 'Somalia':ti,ab,kw OR 'South Africa':ti,ab,kw OR 'Sudan':ti,ab,kw OR 'Swaziland':ti,ab,kw OR 'Eswatini':ti,ab,kw OR 'Tanzania':ti,ab,kw OR 'Togo':ti,ab,kw OR 'Uganda':ti,ab,kw OR 'Zambia':ti,ab,kw OR 'Zimbabwe':ti,ab,kw)
CINAHL

1. (MH "Human Immunodeficiency Virus+" OR MH "HIV Infections+" OR "HIV" TI "HIV" OR TI "AIDS" OR TI "human immunodeficiency virus" OR TI "Acquired immunodeficiency syndrome" OR TI "antiretroviral therapy" OR TI "ART" OR TI "ARV**" OR TI "Antiretroviral" OR TI "anti-retroviral"** OR TI "HAART" OR TI "CART" OR MH "Anti-HIV Agents+" OR MH "Anti-Retroviral Agents+")

AND

2. (MH "Medication Compliance" OR TI "medication adherence" OR “follow up” OR “follow-up” OR “loss-to-follow-up” OR “lost-to-follow-up” OR “loss to retention” OR “lost to retention” OR “treatment initiation” OR “treatment failure” OR “virological failure” OR “virologic failure” OR “viral failure” OR retention OR retain* OR attrition OR “viral suppression” OR “virological suppression”)

AND

3. (MH “Young Adult” OR MH “Adolescence+” OR "young adult" OR adolescen* OR teen* OR youth OR young OR child* OR paediatric* OR pediatric*)

AND

4. (“Health Services” OR “Quality of Health Care” OR “HIV care” OR “care” OR “quality of care” OR “health care” OR “healthcare” OR health OR “health services” OR "healthcare services" OR “adolescent care” OR “adolescent health” OR “adolescent health care” OR “adolescent healthcare” OR “adolescent healthcare” OR MH “Clinical Trials+” OR MH “Randomized Controlled Trials+” OR “Clinical Trial” OR intervention* OR “clinical trial” OR trial OR “randomized controlled trial” OR “randomized controlled trial OR RCT)

AND

5. (“Africa South of the Sahara” OR "sub-Saharan Africa" OR "sub-Saharan Africa" OR "Africa" OR Angola OR Benin OR Botswana OR Burundi OR Cameroon OR "Cape Verde" OR "Central African Republic" OR Chad OR Comoros OR Djibouti OR Guinea OR Eritrea OR Ethiopia OR Gabon OR Gambia OR Ghana OR Guinea OR Guinea-Bissau OR Kenya OR Lesotho OR Liberia OR Madagascar OR Malawi OR Mali OR Mauritania OR Mauritius OR Mozambique OR Namibia OR Niger OR Nigeria OR Reunion OR Rwanda OR Principe OR Senegal OR Seychelles OR Somalia OR "South Africa" OR Sudan OR Swaziland OR Eswatini OR Tanzania OR Togo OR Uganda OR Zambia OR Zimbabwe OR MH "Africa, Eastern+" OR MH "Africa, Southern+" OR MH "Africa South of the Sahara+" OR MH "South Africa" OR MH "Namibia" OR MH "Africa, Central+")
APPENDIX D: CFIR CONSTRUCTS

Domain 1: Characteristics of the Intervention
- Intervention source: Perception about whether intervention is externally or internally developed
- Evidence Strength and Quality: Perception of the quality and validity of evidence supporting the belief that the intervention will have desired outcomes
- Relative Advantage: Perception of the advantage of implementing the intervention versus an alternative solution
- Adaptability: Degree to which an intervention can be tailored to meet the needs of an organization
- Trialability: Ability to test the intervention on a small scale, and to reverse course if warranted
- Complexity: Perceived difficulty of implementation
- Design Quality and Packaging: Perceived excellence in how the intervention is bundled and presented
- Cost: Cost of the intervention and costs associated with implementing the intervention

Domain 2: Outer Setting
- Patient Needs and Resources: Extent to which patient needs are accurately known and prioritized by the organization
- Cosmopolitanism: Level of connectedness and networks with other organizations
- Peer Pressure: Competitive pressure to implement an intervention
- External Policy and Incentives: external strategies to spread interventions, including policy and regulations, mandates, recommendations and guidelines, etc.

Domain 3: Inner Setting
- Structural characteristics: Age, maturity, or size of the organization
- Networks and Communication: Nature and quality of webs of social networks and the nature and quality of formal and informal communications within an organization
- Culture: Norms, values, and basic assumptions of a given organization
- Implementation climate: Relative priority of implementing the current intervention versus other competing priorities
- Readiness for Implementation: Access to resources, knowledge, and information about the intervention

Domain 4: Individuals involved in implementation
- Knowledge and Beliefs about Intervention: Individual staff knowledge and attitude towards the intervention
- Self-efficacy: An individual’s belief in their capabilities to execute the implementation
- Individual State of Change: Phase an individual is in as he or she progresses toward skilled, enthusiastic, and sustained use of the intervention
• Individual Identification with Organization: Individuals' perception of the organization and their relationship and degree of commitment to the organization
• Other Personal Attributes: Personal traits such as tolerance of ambiguity, intellectual ability, motivation, etc.

**Domain 5: Process of implementation**
• Planning: Planning for the implementation
• Engaging: Engaging individuals in implementation processes Executing: Executing the implementation plan
• Reflecting and Evaluating: Reflecting and evaluating the progress of implementation
APPENDIX E: PEER COUNSELOR SEMI-STRUCTURED INTERVIEW GUIDE

- Can you tell me about your experience working with youth that needed your assistance? How would you describe it? Were there any challenges talking with the youth? (Probes: What was the best part? What about the easiest? What was most difficult about working with the youth that needed your assistance?)

- How did the schedule of working with the youth work for you? (Probes: do you have suggestions for ways the schedule could be better for you? For the youth? …Follow up questions around the logistics of repeated regular involvement for an hour with participants)

- You have received some training and now had experience working with youth. How do you feel about this training? What have you learned from the training? Did you find the training useful so you could work with the youth? In what ways did you support the youth? Did you use any particular strategies, tools, approaches? (Probes: On a scale of 1 to 10 how qualified do you think that you are to work with young people as a counselor? Why did you choose that number? (Follow up question related to training and its adequacy)

- Were there any topics you felt were hard to talk with the youth about? Can you give me an example? Why was that topic hard? What did you do when the topic came up? How did you talk with the youth about this hard topic? Did any other topics come up that were hard? Can you tell me about them?

- Tell us your impressions and thoughts on the weekly de-brief and support sessions that you had to participate in. Do you have any suggestions for ways to improve these? Were there any challenges with these? What did you find were the benefits of these sessions? (Follow up questions related to whether they felt adequately supported)

- What other thoughts or recommendations do you have to others who would be in your position one day. (follow up questions highly dependent on how question is answered and will likely relate to questions as above).

- How has this training changed you, how you interact with friends, or how you feel about yourself?
APPENDIX F: REFLECTIVE NOTES

I. Characteristics of Individuals

**Barrier # 1:** Clients are reluctant to confide in the peer counselors, especially during initial sessions. However, trust and rapport develop as the sessions progress.

- **CFIR Domain:** Characteristics of Individuals
- **CFIR Constructs:** Knowledge and Beliefs about the Intervention, Other Personal Attributes
- **Emergent Codes:** Barriers, Reticence and Lack of Trust, Client Preferences and Attitudes, Dishonesty
- **Summary:** Reasons for lack of trust or reticence during the sessions can be due to personality traits (clients who are naturally quiet and shy), and clients who have seen the counselor in the community and fear that the counselors will disclose their personal information. Some clients were dishonest during sessions which may also imply lack of trust or poor confidence in the counselors. Although building trust is usually difficult during the first sessions, trust and rapport usually improves as the counseling sessions progress. Therefore, rapport building is needed to break this barrier. Parent perceptions can influence participation in the intervention. Two counselors suggested that clients are reluctant to attend counseling sessions with counselors whom they already know from the community. If clients are counseled by someone they already know, their personal information may be disclosed outside of the sessions. However, in most cases, these concerns, especially getting clients to open up, resolve over time once rapport and trust is established as the sessions progress.
- **Emergent Implementation Strategies:** Alter communication style to make clients more comfortable to engage (e.g., “pretending like we are friends”, icebreakers, reassurance that this is a safe space)

**Barrier # 2:** Parents may not approve of their child participating in the intervention.

- **CFIR Domain:** Characteristics of Individuals (or Outer Setting due to cultural norms around counseling)
- **CFIR Constructs:** Knowledge and Beliefs about the Intervention, Other Personal Attributes
- **Emergent Codes:** Barriers, Family disapproval
- **Summary:** Clients may have a discomfort or fear of disclosing personal information during counseling sessions due to family hesitancy around counseling such as fear of revealing “family secrets” (fear of disclosing is related to Barrier # 1). Parents may also not allow clients to come back for counseling. Another issue that may arise is that one parent may approve of their child participating in the sessions while another parent may not.
- **Emergent Implementation Strategies:** Educating parents about the importance of counseling for youth.

**Barrier # 3:** Some counselors experience the same hardship as their clients, which makes it difficult for them to continue with the counseling sessions.

- **CFIR Domain:** Characteristics of Individuals
- **CFIR Constructs:** Self-Efficacy, Other Personal Attributes
• **Emergent Codes:** Barriers, Emotional Burden, Navigating hard topics, Client preferences and attitudes, Confidence or self-efficacy

• **Summary:** Many lay counselors have experienced the same hardships as their clients and are unable to continue sessions if they become emotionally triggered by a shared experience with their client. This is related to self-efficacy since difficult topics affect their level of confidence in delivering PST. Some counselors still took on the emotional burden of counseling as they felt it was a moral obligation to support their client or because the client did not want to be referred to a different counselor. Clients deal with the same hardships as their clients, but then have issues making referrals and may feel obligated to continue providing counseling (which speaks to how invested they are).

• **Implementation Strategies:** Stepping out of the room to get a class of water, concealing their emotions during the sessions, and later addressing them during an individual or group counseling session

**Barrier # 4/Facilitator # 1:** Counselors have varying degrees of confidence regarding their qualifications and level of competence as counselors.

• **CFIR Domain:** Characteristics of Individuals

• **CFIR Constructs:** Self-Efficacy

• **Emergent Codes:** Barriers, Navigating hard topics, Confidence or self-efficacy

• **Summary:** Counselors may have a low or high level of confidence in their ability to provide problem solving therapy to their clients. However, there may be difficult topics or situations that arise which counselors may not be prepared to handle such as rape, suicidal ideation, family issues, or issues around HIV disclosure. On the other hand, some feel confident in managing their role as counselors as they feel prepared and able to perform their role as counselors due to adequate training and experience while some do not feel as confident. Some have confidence in their ability to fulfill their roles. Counselors may feel unprepared to handle sensitive or difficult topics such as rape, especially if they have never experienced it or due to lack of training. Depending on the severity of the problem discussed, counselors may lose confidence in their ability to help the client solve the problem. Some clients may not feel like they had enough exposure to certain populations (e.g., some may feel more confident in counseling males than females). One counselor (A18/A11) felt that their client load affected their confidence in providing counseling; it seems like some clients were not attending counseling sessions and the counselor needs more resources. Another counselor though the training did not prepare them adequately for their role as counselors which can impact their confidence in their ability to implement the intervention.

• **Emergent Implementation Strategies:** More training, more experience with clients

**Facilitator # 2:** Counselors believe that implementation by peer counselors is generally acceptable and appropriate since they are similar age as their clients (this is contrary to Barrier # 1 regarding clients not trusting the counselors, at least initially).

• **CFIR Domain:** Characteristics of Individuals

• **CFIR Constructs:** Knowledge and Beliefs, Other Personal Attributes
Emergent Codes: Facilitators, Client preferences and attitudes, Cultural factors related to age, Peer status

Summary: Counselors found that their clients prefer communicating with their peers, or even "near peers" rather than older adults. Older adults lack an understanding of youth culture and therefore clients may not be able to be themselves if working with an older counselor. Due to social taboos, clients may not feel comfortable talking to older adults about their personal issues such as sex, relationships, and drug use. And older adults may not understand youth culture or “street language.” The counselors' status as peers (or near-peers) is acceptable and appropriate because it makes them relatable to their clients. Peer relationships facilitate conversations about hard topics such as sex and cyber bullying. Age is a factor in terms of how well counselors will be able to relate to their clients. Due to their similar age category, counselors understand youth culture, lingo, and social media use. There also may be a sense of superiority when it comes to older adults, but as peers, counselors operate on the same level as their clients, and counselors try their best to communicate with their clients like friends and peers.

Facilitator # 3: Counselors are personally invested in Friendship Bench because they understand the benefits of their participation among themselves and for the clients they serve.

CFIR Domain: Characteristics of Individuals (or Intervention Characteristics)
CFIR Constructs: Knowledge and Beliefs, Other Personal Attributes (or Intervention Source, Evidence Strength and Quality, Relative Advantage)
Emergent Codes: Facilitators, Counselor perceptions and motivations, Personal growth and satisfaction, Cultural factors related to age
Summary: Counselors are personally motivated to participate in Friendship Bench. Positive counselor perceptions about Friendship Bench contributes to their intrinsic motivations to participate in the intervention. Their value and sense of self-fulfillment placed on the intervention is what motivates them to remain Friendship Bench. They understand the value of the intervention for their clients. Despite low compensation, counselors still found their participation in the intervention valuable. Some counselors see the positive impact that the intervention has on young people and see the personal progress in their clients, which may serve as a motivation for them to continue in their role as counselors. Many counselors found personal value in participating in Friendship Bench for themselves and for their clients. Counselors’ perceived value of the intervention may determine how motivated they are to participate in Friendship Bench. Friendship Bench served as a confidence booster for many counselors and gave counselors the ability to help their family and friends. Some counselors experienced positive changes in their character and wellness.

II. Intervention Characteristics
Facilitator # 4: Counselors believe that the intervention is working (this is related to Facilitator # 3).

CFIR Domain: Intervention Characteristic
CFIR Constructs: Evidence Strength and Quality, Relative Advantage
• **Emergent Codes**: Facilitators, Counselor perceptions and motivations
• **Summary**: The counselors acknowledge the impact that Friendship Bench is having on their clients’ lives with anecdotal stories of their client's experiences (Evidence Strength and Quality) such as the clients are feeling confident in solving a problem on their own (i.e., confidence boosters). Counselors expressed that the peer-based counseling is even better than the traditional counseling provided by older adults (Relative Advantage).

**Barrier # 5**: Some counselors thought that the training covered to much information in a short period of time.

- **CFIR Domain**: Intervention Characteristic
- **CFIR Constructs**: Complexity
- **Emergent Codes**: Barriers, Training
- **Summary**: Some counselors expressed that the training sessions covered too much information in a short period of time. Counselors touched on concerns about retaining the information that they learned during the training, especially during periods when they are not seeing any clients (this was addressed in Barrier # 12). However, counselors found the training content to be helpful and necessary for helping them perform their jobs, but also expressed the additional training needs that they needed.

- **Implementation strategy**: Extend the length of the training

### III. Outer Setting

**Barrier # 6**: The location of the intervention is not ideal for all clients and counselors.

- **CFIR Domain**: Outer Setting
- **CFIR Constructs**: Patient Needs and Resources
- **Emergent Codes**: Barriers, Client preferences and attitudes, Location of counseling sessions
- **Summary**: The location of the counseling sessions is not ideal for clients who live far away from Baylor, have disabilities, and can only attend during school hours. The location may also not be ideal for clients with parents who disapprove of the intervention. COVID-19 fears and protocols can also limit participation in counseling sessions. One counselor expressed their concern about COVID-19 exposure during attendance to the debriefing sessions. Some clients may not prefer the Baylor as a location since due to fears that their sessions will be shared with doctors (related to Barrier #1).

- **Emergent Implementation strategies**: Satellite locations and implementation in schools. Some counselors recommended having the sessions in school settings since the location of the sessions may not be ideal for clients who do not have parental approval to participate in the sessions and to avoid interfering with academic learning (e.g., have sessions during school lunch hours).

**Barrier # 7**: The duration and frequency of the counseling sessions may not be enough for clients with complex issues/needs.

- **CFIR Domain**: Outer Setting
- **CFIR Constructs**: Patient Needs and Resources
- **Related Emergent Codes**: Barriers, Duration and frequency of sessions
Summary: The duration or frequency of the counseling sessions were not enough for some clients. Counselors mentioned that some issues take more or less time to work through.

Emergent Implementation Strategies: Extend session length and frequency for clients who need it.

Barrier # 8: Societal views and cultural norms regarding counseling in Botswana may hinder client participation (related to Barrier # 2 and Facilitator # 2)

- CFIR Domain: Outer Setting
- CFIR Constructs: None
- Emergent Codes: Barriers, Duration and frequency of sessions, Societal norms and views
- Summary: Parents may not approve of clients receiving counseling as it may be viewed as a social taboo. Older people may not think that young people need counseling and may believe that young people do not have anxiety, depression, or substance abuse problems. Conversations about how clients may not be able to be themselves if working with an older counselor. This may also refer to how adolescents deal with stress (e.g., substance abuse).
- Emergent Implementation Strategies: Education about the importance of counseling and Friendship Bench in the community

Barrier # 9: Clients may have competing needs which may prevent participation in the intervention (not salient, only one counselor alluded to this)

- CFIR Domain: Outer Setting
- CFIR Constructs: Patient Needs and Resources
- Emergent Codes: Barriers, Competing needs
- Summary: Some clients may have competing needs that may prevent them from attending counseling sessions such as the need for money.

IV. Inner Setting

Barrier # 10: Counselors do not feel valued enough for their work

- CFIR Domain: Inner Setting
- CFIR Constructs: Learning Climate, Culture
- Emergent Codes: Barriers, Compensation and travel expenses, Counselor perceptions and motivations
- Summary: Some clients do not feel valued enough for their work due to low compensation whereby others did feel valued enough by their peers or by leaders.
- Implementation strategies: Options for tenure, higher compensation (can improve motivation)

Barrier # 11: Counselors do not have enough money for transportation to the intervention site.

- CFIR Domain: Inner Setting
- CFIR Constructs: Available Resources
- Emergent Codes: Barriers, Compensation and travel expenses
• **Summary:** A counselor raised a concern that they were not getting enough money for transport, and the combi prices went up.
• **Implementation strategies:** Higher compensation (can improve motivation)

**Barrier # 12:** Some counselors have conflicts or lack trust among their peers.

- **CFIR Domain:** Inner Setting
- **CFIR Constructs:** Culture, Networks and Communications
- **Emergent Codes:** Barriers, Coworker trust, Coworker conflict
- **Summary:** Some counselors are hesitant to share information during debriefing or support sessions out of fear that a colleague will disclose the information outside of the sessions and there may be conflict between counselors which can hinder performance or implementation of the intervention. One counselor stated that they do not get along with one of the other counselor. A few counselors mentioned that there was a “snitch” who disclosed information shared during the briefing sessions.
- **Implementation strategies:** Mediation among leadership staff

**Facilitator # 5:** Counselors feel supported by leadership.

- **CFIR Domain:** Inner Setting
- **CFIR Constructs:** Leadership Engagement, Networks and Communications
- **Emergent Codes:** Facilitators, Leadership and staff support
- **Summary:** The extent to which counselors feel supported by leadership, overseers of the intervention, and staff psychologists. This also includes discussions about how counselors are emotionally supported during debrief and support sessions and how counselors expressed the emotional support they needed (and what they found helpful).

**V. Process**

**Barrier # 13:** Counselors believe that they were not getting enough clients (a part of it due to COVID).

- **CFIR Domain:** Process
- **CFIR Constructs:** Reflecting and Evaluating, Executing
- **Emergent Codes:** Barriers, Recruitment and client load
- **Summary:** Some counselors thought that clients were not being screened fast enough which was preventing them from seeing more clients. Counselors wished to have more clients than what they were getting. One counselor expressed the concern that if they were not getting enough clients, they will eventually forget the information they learned during the training.
- **Emergent Implementation Strategies:** Have the counselors screen and recruit clients. Some counselors suggested that they do the screenings to improve recruitment of clients and raise awareness about the intervention in the community.

**Barrier # 14:** Counselors have issues with client attendance and scheduling procedures.

- **CFIR Domain:** Process
- **CFIR Constructs:** Reflecting and Evaluating, Executing
• **Emergent Codes**: Barriers, Scheduling procedures

• **Summary**: Some clients were not attending their counseling appointments on time or were not showing up. As a result, counselors either wasted travel time and money to the counseling location and had to return later when the client arrived.

• **Implementation strategy**: Counselors were in favor of the block system which allowed them to reserve a few hours each week for clients. This block system seemed to address the issue of clients showing up late or not showing up at all. Some counselors suggested strategies for improving scheduling and attendance such as hiring full-time workers.

**Facilitator # 6**: The debriefing and counseling sessions were helping the counselors deal with issues they face with their clients, and the counseling was helpful for meeting their own psychosocial needs.

- **CFIR Domain**: Process
- **CFIR Constructs**: Reflecting and Evaluating, Executing
- **Emergent Codes**: Barriers, Scheduling procedures
- **Summary**: If the counselors feel they have adequate support, this can motivate them to stay involved in the intervention. Some counselors have expressed that the debriefing sessions were not long enough, or that they wish that meals were provided during these sessions. However, counselors generally found these sessions helpful and thought that the debrief and support sessions prepared them for counseling sessions with their clients.

**Conclusions**

- Counselors also serving as advocates to address the needs of their clients
- Meeting patient needs, patient-centeredness (e.g., offering sessions virtually, education around COVID-19)
- Some barriers/facilitators can fit into more than one CFIR domain
- CFIR constructs are not all-inclusive: need to expand or tailor domains and constructs in CFIR to fit context
APPENDIX G: THEME DEVELOPMENT MEETING
APPENDIX H: EXPERT CLIENT SEMI-STRUCTURED INTERVIEW GUIDE

1. Please describe what you perceive to be your role in providing services to adolescents living with HIV.
2. What services do you currently provide to adolescents living with HIV?
3. What services do you wish to provide to adolescents living with HIV?
4. How has your experience been working with adolescents living with HIV?
5. How does your experience working with adolescents living with HIV compare to your experiences working with other age groups of people living with HIV?
6. Can you describe your positive experiences working with adolescents living with HIV?
7. Are there any negative experiences you had with working with adolescents living with HIV? If negative, how do you think your experience can be improved?
8. Is there any challenges you face when providing particular services to adolescents living with HIV? How have you approached these challenges?
APPENDIX I: DEDuplicated Hypotheses

Barriers

- Adolescents may be afraid of being seen picking up medications and being judged by others due to HIV stigma (Spotlight Effect/Social Norms)
- Adolescents are overwhelmed when deciding on a time to take ART and the need to stick to a schedule for taking ART (Choice Overload)
- Adolescents may be fearful to disclose to romantic partners (Social Norms)
- Adolescents may not feel comfortable taking their medications outside of their peer groups such as Teen Club (In-Group Bias)
- Adolescents have issues with adhering to their medication because parents/guardians don’t follow up about their adherence (Lack of Salient Cues, Cue-Dependent Forgetting)
- Adolescents lack visual aids and cues such as pill boxes and an alarm to remind them to take ART (Lack of Salient Cues, Cue-Dependent Forgetting)
- Adolescents who are living in poverty lack food and clothing which can interfere with their ART adherence because they are focused on meeting their immediate needs (Scarcity Mindset)
- Adolescents do not adhere to ART because parents are not disclosing to them due to fear and guilt (Ostrich Effect)
- Adolescents do not understand the importance of taking ART because it is not emphasized enough in the community or at the clinic (Mental Models, Salience)
- Adolescents may avoid taking ART medication due to anger, guilt, or lack of acceptance (Ostrich Effect, Empathy Gap; Affect Heuristic or Empathy Gap)
- Adolescents do not take ART consistently because it is inconvenient for them. For instance, there are long queues when they pick up their medications (Hassle Factor)
- Adolescents may not take their ART medications because they are not focused on the life-long benefits of adherence (Present Bias)
- When adolescents reach puberty, they begin to rebel and refuse taking ART against the advice of doctors, nurses, and parents. (Reactance)
- Adolescents do not take ART because they feel hopeless about the future due to their HIV status (Pessimism, Negativity Bias, Empathy Gap)
- Adolescents need incentives to better adhere to ART (Incentives)
- When parents delay disclosure of HIV status to adolescents, adolescents distrust them which causes them to devalue instructions about ART adherence (Reactive devaluation)
- Adolescents do not adhere to ART because they do not receive their medication refills during times when they feel most committed to taking their medication. For instance, they may be more committed when they are at Teen Club because they see their peers which motivates them to adhere to ART.
- Adolescents do not adhere to ART because they do not value advice given to them outside of their peer groups (in-group/out-group/reactive devaluation).
- Adolescents need Teen Club because it is the best option suitable for adherence. Adolescents get refills on Saturdays during Teen Club and transport is included (Choice architecture)
- Adolescents may not take ART because they assume that their peers are not taking ART (pluralistic ignorance)
• Adolescents will forget to take their ART medications because it is a daily commitment, and it may interfere with other commitments and activities (prospective memory failure)
• If Teen Club did not exist, adolescents will have worse adherence to ART because adolescents rely on the safety that Teen Club provides such as peer support and accountability (peer comparison, witnessability, descriptive norms).
APPENDIX J: PROTOTYPE IDEAS

Gain-framed versus loss-framed messaging

Gain-Framed

When you take your pills daily, you can live out your teenage years healthily with your friends.

Loss-Framed

When you don’t take your pills consistently, you miss out on living your teenage years healthily with your friends.

Adolescent versus adult messengers may affect receptivity (messenger effect)

Other forms of message framing

Framing to promote autonomy:

“Taking your HIV meds gives you more power and control over your life. If you do not take your meds consistently, you fall prey to deadly diseases that limit your life.”

Framing as a social norm:

“Did you know that 2,500 adolescents in Eswatini are taking the same medications you take? That’s around the same number of young Swazis who use social media each day.”

Framing as 88% of peers took their medication may have a greater effect on adherence rather than framing as 22% did not take their medications.

“88% of your peers at Teen Club took all of their medications this month. I know you can do the same!”

Relative Ranking
Commitment Contract

I commit to taking my medications in a daily basis, even when I do not feel like it. I am making the decision on my own to take my medication in order to keep myself in good health. If I miss taking my meds, I won’t be eligible for the lottery.

I plan on taking my medication at _______ on these days: ________.

When I am afraid to take my meds or when I am feeling angry about taking them, I will:

- Call a friend that I trust to encourage me to take the medications
- Call a friend who also takes medications to
- Call an expert client to remind me of the importance of taking my meds
- Pray
- Other: ______________________

Signature: __________________________
Witness: ___________________________

Group-Based Regret Lotteries

Group Lottery Rules

Each month, a group will receive a chance to win the lottery if each group member meets the following criteria: achieve at least 95% adherence according to pill counts and be virally suppressed. At baseline, all groups will receive a lottery ticket whereby each member of the winning group will receive the award if their ticket is selected at random. If all members of a group meet the eligibility criteria within a given month, their lottery ticket will be considered for a chance to win a prize. If at least one of the members of a given group do not meet eligible adherence levels, the group’s lottery ticket will be “deactivated” such that if the lottery ticket is selected, the group will not be eligible for the prize. Then, another group lottery ticket will be selected until an eligible group wins.

Activated Ticket

Deactivated Ticket

Leveraging the lottery system to create gain-framed messages

Congratulations! You took all of your medications this week! Now you have the chance to win a lottery for airtime and data bundles.

Sorry, you lost eligibility to win the lottery because your adherence levels were not high enough.

Leveraging the lottery system to create loss-framed messages
APPENDIX K: EXPERT CLIENT PERSPECTIVES ON PROTOTYPE IDEAS

Prompts for Focus Group Meetings: What are your thoughts about this prototype idea? Do you think it is feasible? Have you already tried this? Do you think adolescents would like this idea?

Prototype Idea 1: Group-Based Regret Lotteries

- “Great feasible idea, group members will be able to motivate each other with the aim of winning the prices and through that their ART adherence will improve”
- “But the idea must be modified and go beyond looking at adherence but must also look at the viral loads of the group members”
- “I think the prices must be according to individual’s needs, especial prices that can help improve the adherence of that individual. For example, providing transport fees for a certain period for that beneficiary when that individual has challenges going to clinic”
- “If viral load can be also included in the winning criteria because adolescents being adolescents can be able to come with 100% pill count without adhering to the medication”
- “This is a great idea because this would enhance teamwork among the group members since this will let them know each other’s problems and barriers impeding them to adhere to medication and encourage to help each other with the goal to win the lottery.”
- “Great idea, I think it can also help to create competition in taking the ART treatment among the adolescents through that competition adherence will improve and each adolescent will not want to make the group fail”
- “This idea will also motivate each other because the adolescents will all be interested in winning the prize, so they will keep tracking adherence among themselves. However, this idea may also come with hatred among the adolescents because if one fail to adhere to treatment the whole group will fail”
- “The concern is with the time duration of this intervention and its consistent supply of the goodies during the lotteries to encourage adherence among adolescents.”
- “It is a good solution since it will encourage all members of the group to empower each other on the best tips on how best they can all achieve a good 100% record of ART treatment.”
- “If in the group we have a member who is help or reminded by caregiver in taking their ARVs it means we will always lose the lottery because we got that member in our group it can promote competition and hatred”
- “Would you able to track the viral load in those group who will be winning in fostering transparency and honesty”
- “It is worthy trying it is feasible, in terms of getting the right information in implementing this we need to engage the adolescents first on how best it can be done”

Prototype Idea 2: Framing ART adherence messages as a loss or gain may encourage adolescents to adhere to ART. For example, expert clients can frame ART adherence as a gain with messages like “consistently taking your
medications will give yourself the opportunity to healthily experience your teenage years with your friends” or “if you don’t take your medications, you will lose the opportunity to live as a healthy teenager and miss out on hanging out with your friends.” Another example of a loss message is as “if you don’t take ART, you can lose your chance to win the lottery.”

- “I think it is an idea worth trying, For example if you tell an adolescent that adhering well to medication can make them healthy and be able to go to school normally like other children without being seen that they are HIV positive, that will motivate that adolescent to adhere well to make sure he or she do not feel sick”

- “It is a good idea because it has has worked for us where by we were inspired by the fact that our medication will get us anywhere we want healthily.”

- “To add, when telling an adolescent that adhering well to medication will boost their immune system will help their body fight other illness such as TB, that will motivate the adolescent to improve adherence to ensure he or she do not fall sick from those illnesses”

- “However, I feel like it is very important that the massaging must be realistic and make sure we do not mislead the adolescents”

- “It is a feasible idea”

Prototype Idea 3: Expert clients can frame ART adherence as a basic need for health and longevity as much as food and water.

- “I think it is a great idea, for example when you tell an adolescent that not adhering well to ART is the same as being undressed because you will feel sick and everyone may find out that you are HIV positive while when adhering well you will be healthy and none may think of you being HIV positive, and that can be a motivation for them to take adhere well to their treatment”

- “This idea is great because this will push the adolescents to daily commit themselves in taking their medication, knowing that if they eat and drink, they also as much need to take their medication”

- “A good idea because this could help adolescents not only now but also for the long run, and could be good idea for adulthood transitioning to avoid rebel and refusing advice when they reach puberty.”

- “It is a feasible idea that can help sending the benefits of adherence and make the example relevant”

- “It is an idea that can be tried but must be capacitated to prevent false information”

- “I also think it is a great idea because it can help the adolescents have a picture on the advantages of adherence to the adolescents”

- “I think the adolescents can like the idea”

- “Messages can help them adolescents since they look up to them as their role models”

- “We can develop motivational life quote leaflets which are stigma free”
Prototype Idea 4: Expert clients can frame ART adherence as a gift to promote a sense of reciprocity.

- “I agree with the idea, for example let say in the facility during teen clubs we appreciate new adolescents that have improved their adherence and also state the adherence percentage of the clinic among adolescents, that will motivate the adolescents to improve their adherence to make sure they are counted among those doing well”
- “I think the adolescents will like this idea and it will make them feel proud of themselves in the clinics as they will feel like they are playing a big role in achieving high rate of ART adherence in the clinic”
- “I also agree with the idea because it will make the adolescents feel part of what is happening in the clinics and that will motivate them and will not want to let the clinics down, that will result in all adolescents adhering to their treatment”

Prototype Idea 5: ART adherence can be framed as an avenue to build autonomy by allowing them to live free from HIV-related illnesses.

- “It is a very good idea, from my personal experience I was treated for TB [tuberculosis] and I was told that adhering very well to ART treatment will boost my immune system and that will help fight the TB and also make sure I do not get reinfected in the future, being told I was motivated and started adhering very well”
- “I think the adolescent can like this idea as it will give realistic facts about the medication and that will make them believe in it, it is a feasible idea”
- “It’s a great idea for the adolescents because this will encourage adolescents to live long and healthy lives which would be key in ensuring that they achieve what they want in their lives.”
- “The CATS also suggested that representatives of the adolescents in programming of such interventions.”
- “I also agree with the idea, and it already used because mostly adolescents are motivated by those facts such as how the medication can help you or prevent you from, for example Undetectable equal un-transmitted has motivated lot of adolescents.”

Prototype Idea 6: Adolescents listen if they received a personalized message from expert client about ART that can be given to the adolescents during medication refills. An example of a personalized messages is “Dear Ndumiso. I’m looking forward to seeing you back at the clinic. I’m really believe in you” and having an expert client sign the message.

- “No, I do not agree with this idea because mostly adolescents do not disclose to everyone they stay with, so sending such massages may results in accidentally disclosure”
- “To add, adolescents’ personal phones are sometimes used by their friends so sending such massages may end up being questioned which may end in accidental disclosure
- “However, I may I agree with this idea if the massages will have certain securities such no access without pressing a confidential key
“I also do not agree with this idea because the is a high risk of accidental disclosure let say you phone is charging then such a message pops up and seen by someone you have not disclosed to”

“This is not a good idea because the clinic is accessed by diverse people from the community, which can put the CATS to forced disclosure to the public.”

“This could only be done upon compensation from the donors and implementers for publicly disclosing the expert clients’ HIV statuses.”

“To add, I feel like even from the sender of the massage, the massages may not be safe and that also increase the risk of accidental disclosure”

“It cannot work in the facility for expert clients since there is no time for that. It can work with peer facilitators and mentors, not expect clients”

Prototype Idea 7: If you tell adolescents about the large number of adolescents on ART and virally suppressed, they may be motivated to adhere to ART due to the large number of people their age on ART. Also emphasizing the number of lives saved on ART may also encourage adolescents to adhere to the medications.

“It is a very good idea because it will increase the level of trust bout the benefits of adhering to the ART treatment, some adolescents take ART and it takes time for them to recover from being sick so having such evidences may motivate them not to give up on ART”

“I think the adolescent may like this idea and it is feasible”

“I think it a great idea because it will make the adolescent believe in the medication when they are told about the evidence that the medication is working”

“This is a great idea that will encourage the adolescents to be counted among the virally suppressed in the country.”

“They are to share with other peers if one is viral suppressed can motivate others to ART adherence.”

Prototype Idea 8: Educational messages around the importance of daily ART adherence may hold more weight among same-aged peers than the same messages delivered by an adult-aged expert client. Adolescent-aged expert clients or CATS can talk about the reasons why they are on ART and highlight the benefit of ART to encourage adolescents to adhere. Adolescents would better receive ART adherence advice from adolescent expert clients rather than adult expert clients.

“That is very great idea to choose same aged peers from my personal experience when I started medication I used to feel anger when the old expert client told to take medication because I felt like they do not understand what I am going through and they used to make example I did understand when trying to motivate me take medication, I was then introduced to teen club where I found peers talking about their experiences while living with HIV, I was so motivated and I felt belonging there”

“In addition, felt like they understood me better than the other expert clients and they answered almost all my unanswered questions, I was motivated to adhere to ART because I saw my peers getting better and believed I can be like them”
• “However, they must be well capacitated so that they can be able to deal with challenges faced by the other peers"
• “It is a very good idea to choose peer support because adolescents understand each other compared to when they are motivated by adults, the language used by adolescents sometimes become a barrier to understand some situation so when it is peer to peer supports most of the time, they understand better”
• “It can work since they will relate since it is coming from their age mate”

Prototype Idea 9: Expert clients can leverage the human tendency to compare our performance to that of our peers. For instance, expert clients can consider sending messages to alert adolescents when their peers have higher adherence levels than them. The expert client will not reveal the names of the peers to maintain confidentiality.

• “I don’t think it is a great idea because it can make such adolescents angry that they are being compared with others while they are going through different challenges, and it may feel like we saying adolescent A is better than adolescent B”
• “I also feel like this idea may increase high number of lost-to-follow or defaulters because the adolescents may fear being compared to other which may lead them to run away from the facility”
• “However, if the messages have been delivered politely and with no judging elements, it may be a great idea because the adolescent may be motivated and believe it is possible even for them to achieve”
• “I do not agree with this idea because they adolescents may feel judged by the expert clients, and they may feel like failures at some point”
• “It can be a two way it can be positive or negative since it promotes competition and there is no confidentiality.”

Prototype Idea 10: Expert clients can post pictures of themselves around the ART clinic with quotes of positive reasons why they would adhere to ART. If adolescents can see that expert clients are willing to disclose their status publicly, they may also be encouraged to do the same

• “No don’t like this idea because it will now expose the expert clients to the whole clinics and community that they are living with HIV, not just the ART department only”
• “This is not a good idea because the clinic is accessed by diverse people from the community, which can put the CATS to forced disclosure to the public.”
• “This could only be done upon compensation from the donors and implementers for publicly disclosing the expert clients’ HIV statuses.”
• “Mostly, when people see such pictures, they assume that the person has been paid to do that and that situation is not real, and that will not serve the purpose of the picture”
• “However, with consent from expert client, it can motivate seeing that even the health care workers are living with HIV and that will make the adolescents have bonds with the expert client and that will increase level of understanding among them.”
• “I strongly disagree with this idea because it will reveal the experts’ client status public which will raise fear among the other adolescents that if they continue adhering it is possible that such thing may happen to them.”
• “It cannot work since the expert clients can be accidental disclosure especially if they are in discordant relationships and it promote stigma and discrimination.”

Prototype Idea 11: Commitment Contracts with implementation prompts
• “It is a great idea because mostly, poor adhering adolescents are those without care at household level, so having someone that will be committed in achieving the adherence goals will make things easy as it will be monitored daily compared when monitored monthly” “it is a very great idea because it can help the facility to know who is responsible for taking care of the adolescents and be able to cater for the adolescents needs”
• “Public Commitments may not be feasible since some adolescents are not willing to disclose their HIV status publicly.”
• “The personal commitments would work for the best because every adolescent can work on the common goal to keep up with the agreement and be accountable to it.”
• “Expert Clients like the idea of writing down implementation intentions, or specific goals for successful adherence to ART.”
• “Adolescents can also write love letters to themselves indicating the importance of adherence to their lives.”

Other Intervention Ideas from Expert Clients:
• “When they are at support groups or Teens Clubs, we should also engage caregivers explain about important of disclosure to adolescents living with HIV”
• “Livelihoods projects as poultry and vegetable farming for sustainability of adolescents”
• “Capacitate peer to peer facilitators and mentor who are running teen clubs and support groups”
• “Community outreach in capacitate communities on HIV literacy as well as stigma and discrimination awareness in the community”


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