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## **Living positive with HIV in Botswana: a self-help intervention for people living with HIV and depressive symptoms**

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A self-help intervention for people living with HIV and depressive symptoms

Boitumelo Vavani

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**Living positive with HIV in Botswana**  
A self-help intervention for people living with HIV and depressive symptoms

Proefschrift

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de graad van Doctor aan de Universiteit Leiden,  
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geboren te Maitengwe, Botswana  
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Prof.dr. John de Wit (Universiteit Utrecht)

To my father, in recognition of his life's work as an educator whose dedication and perseverance shaped my academic pursuits.



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# Chapter 1

## General Introduction



## 1. HIV and HIV prevalence

Human Immunodeficiency Virus (HIV) is a significant global public health challenge affecting an estimated 39.9 million people worldwide by the end of 2023 (World Health Organization, 2024). In Africa, the prevalence of HIV has remained high and the majority (67%) of people living with HIV (PLWH) globally, are found in sub-Saharan Africa (Moyo et al., 2023). Botswana's HIV prevalence also remains high (Mine et al., 2024), placing the country as one of the most affected by the epidemic.

*"HIV reclaims title of Botswana's biggest killer"*: an unsettling headline that appeared on a local newspaper (Sunday Standard newspaper dated May 12th, 2025). This is, however, not an exaggerated newspaper article, as the annual report by Statistics Botswana (2025) indicates that by 2023 HIV remains the leading cause of mortality in Botswana. This is a reminder that despite decades of national progress in HIV treatment and care, the HIV epidemic remains a burden in Botswana (Simela, Kelepile, & Sebohi, 2025). National estimates based on the fifth Botswana AIDS Impact survey (BAIS V) conducted in 2021 indicate that approximately 20.8% of adults in Botswana aged 15–64 years are living with HIV, corresponding to more than 329,000 adults (Government of Botswana, 2023). The BAIS V reported that the prevalence of HIV is higher among women (26.2%) compared to men (15.2%) (Government of Botswana, 2023), raising questions regarding gender-based factors that may contribute to increased vulnerability among women.

During a public address, the Acting Deputy Coordinator of the National AIDS and Health Promotion Agency (NAHPA), delivered an unsettling observation: *"A handful of men are spreading the virus to many women in Botswana."* His statement tells the complex dynamics that continue to fuel the spread of the epidemic and highlights factors such as gender inequality and gaps in HIV prevention. It has been argued that women in Botswana are more vulnerable to HIV infection due to socio-economic factors, gendered ideologies and cultural practices (Ellece, 2016). According to a report by the World Bank (2025), despite educational progress, women in Botswana continue to face economic and social inequalities including lower rates of employment which limits their access to finances. Mostly women in Botswana do informal work which increases their vulnerability to poverty and health risks, including HIV (World Bank, 2025).

In response to the HIV crises, Botswana has positioned HIV prevention and treatment as a national health priority (NAHPA, 2020). Antiretroviral therapy (ART) is provided free of charge in public facilities, and the country has surpassed the UNAIDS 95-95-95 targets: over 95% of PLWH know their status, nearly all of those diagnosed are on ART, and the vast majority achieve viral suppression (Government of Botswana, 2023). Botswana is also the first country in the world to achieve the World Health Organization's "gold tier" status for the elimination of mother-to-child transmission of HIV (WHO, 2025). These achievements reflect investment in health systems, and community engagement.

Living with HIV today has been transformed by ART (Daniel, Semvua, Anna, Bonaventura, & Elichilia, 2017; Jima, Angamo, & Wabe, 2013). The treatment suppresses viral replication, leading to a reduced amount of the virus in the blood (viral load) (UNAIDS, 2016). With consistent adherence, viral load can be reduced to undetectable levels, preserving immune function, preventing opportunistic

infections, enabling near-normal life expectancy and reducing the transmission of HIV (UNAIDS, 2016). This highlights both the individual and public health benefits of ART adherence. However, there are concerns about the future of HIV treatment; financial aid is under pressure, and it is expected that globally less ART will be available, especially in Africa (e.g., due to the termination of a significant component of the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) funding) (Tram, Ratevosian, & Beyrer, 2025). Additionally, there are reported disruptions in the supply of ART, and many HIV facilities have closed due to funding cuts, preventing individuals living with HIV from accessing life-saving treatment (Magura, Nhari, & Nzimakwe, 2025). This may lead to a rise in new infections and the numbers of PLWH (Tram, Ratevosian, & Beyrer, 2025) undermining efforts towards HIV care and treatment so far.

## **2. *Depressive symptoms among PLWH***

Living with HIV extends beyond medical care. PLWH often contend with stigma, discrimination, and psychosocial stressors that impact mental health and overall well-being (Setlhare, Wright & Couper, 2015). Depressive symptoms (including depressive disorders) are particularly common among PLWH, with global estimates suggesting that up to one-third of PLWH experience depressive symptoms (Rezaei et al., 2019). In sub-Saharan Africa, the prevalence of depressive symptoms among PLWH is also high. Recent systematic reviews and meta-analyses estimated the prevalence of depressive symptoms among PLWH in Africa to be 36% (Molapo, Mokgalaboni, & Phoswa, 2025) and 33.32% (Tadesse et al., 2025). Another earlier meta-analysis reviewing journal articles published between 2000 and 2018 found the prevalence of depressive symptoms among PLHIV to be 36.5% (Bigna et al., 2019). These statistics match global estimates indicating that at least a third of PLWH in Africa struggle with depressive symptoms.

Studies in Botswana showed that between 24% and 48% of PLWH experience depressive symptoms (Brooks et al., 2023; Lawler et al., 2011; Lewis, Mosepele, Seloilwe, & Lawler, 2012; Vavani et al., 2020), placing the prevalence of depressive symptoms as high as the global prevalence. Depressive symptoms in PLWH are associated with multiple negative outcomes. Some examples include a decline in health and functioning (GBD Mental Disorders Collaborators, 2022); delay in achieving HIV viral suppression (Huang et al., 2025); more frequent hospital visits (Boulanger, Zhao, Bao, & Russell, 2009), poor medication adherence (Zhou et al., 2022) and increased mortality (Abas, Ali, Nakimuli-Mpungu, Chibanda, 2014). These negative outcomes may potentially result in increased new infections. These negative outcomes also underscore the need for a comprehensive approach to HIV care that integrates mental health care alongside medical treatment. As it seems, it is increasingly evident that the world must be concerned with addressing the full burden of HIV, going beyond the physical and also addressing the psychological challenges faced by PLWH.

### *2.1 Interventions for depressive symptoms among PLWH*

Despite the severe impact, depressive symptoms among PLWH often remain underdiagnosed and undertreated, particularly in resource-limited settings where mental health services are scarce or inaccessible (Maphisa, 2019; Qambayot & Naidoo, 2023). Additionally, accessibility of mental health services in low-and-middle-income countries (LMICs) is hampered by mental health-related stigma and

poor mental health literacy (Grimes et al., 2024). In Botswana, low mental health literacy and stigma seem to negatively affect access to mental health services (Monteiro, 2014). Human resources are also limited with psychiatrist-to-population ratios being low. For instance, compared to the global average of 3.96 psychiatrists per 100,000 people in high-income countries, there are 0.04 to 0.30 psychiatrists per 100,000 people in LMICs (Rathod et al., 2017). These professionals are mostly based in urban areas and may not be accessible to those in rural areas, creating a treatment gap which is exacerbated by other factors such as poverty, conflict, social inequalities, limited budget for mental health, limited infrastructure, and low self-worth (Rathod et al., 2017).

Botswana, like many developing countries, faces a critical shortage of mental health professionals (Maphisa, 2019), and the few professionals are often clustered in urban centers (Madigele, Moeti & Moeti, 2024). Nonetheless, Botswana has made strides in addressing mental health issues in general, such as through the development of mental health policies and the establishment of psychology departments in some hospitals to offer face to face counselling and other psychological services (Sidandi, Opondo, & Tidimane, 2011). There is also the Mental Health Act of 2023 (Government of Botswana, 2023) which guides the care, treatment and services for persons with mental health conditions in Botswana. Despite these efforts, there is still far too little capacity to provide mental health care to every patient (Maphisa, 2019).

Traditional models of mental health treatment, such as relying on specialized clinical services, face numerous barriers in low- and middle-income countries (LMICs) where the majority of PLWH reside (Galea, Marhefka, Cyrus, Contreras, & Brown, 2020). There is a need for mental health interventions that are scalable, cost-effective, and easy to implement in primary care or community settings. For instance, Botswana's HIV clinics already operate with well-established workflows, regular ART refill appointments, viral load checks, and adherence counseling sessions (Ministry of Health, 2023). Embedding a brief mental health screening into these processes could be a low-cost, high-impact intervention, especially if followed by simple referral or psychosocial support options. However, once depression is identified, what happens next?

Self-help interventions, particularly those based on Cognitive Behavioral Therapy (CBT), have emerged as promising tools for managing depressive symptoms in various populations, including PLWH (Arjadi, Nauta, Chowdhary, & Bockting, 2015; Bockting, Williams, Carswell, & Grech, 2016; Matcham et al., 2014; Naslund et al., 2017). CBT is an evidence-based psychological approach that helps individuals identify and change unhelpful thought patterns and behaviors that contribute to depressive symptoms (Gautam, Tripathi, Deshmukh, & Gaur, 2020). Its structured, time-limited, and skills-based nature makes it particularly suited for adaptation into self-help formats (Gaudiano, 2008). While CBT-based self-help interventions have demonstrated effectiveness in high-income settings (e.g., Kraaij et al., 2010; van Luenen, Kraaij, Spinhoven, & Garnefski, 2016; Andersson, Titov, Dear, Rozenal & Carlbring, 2019; Cuijpers, Noma, Karyotaki, Cipriani & Furukawa, 2019), their adaptation and implementation in LMICs need more exploration as there are many barriers to intervention design and delivery (Verhey, Ryan, Scherer, & Magidson, 2020). Furthermore, understanding the contextual factors that influence the

acceptability, feasibility, and sustainability of these interventions is crucial for successful adaptation and implementation (Verhey, Ryan, Scherer, & Magidson, 2020).

Self-help programs are efficient in alleviating symptoms of depression (Matcham et al., 2014), and have the advantage of being cost-effective, can help many people at the same time, at their own place and time, without stigma (Bower, Richards, & Lovell, 2001). Moreover, self-help interventions involve less staff time (Wright et al., 2005), can be computer-adapted (Arjadi, Nauta, Chowdhary & Bockting, 2015), and are suggested to be more suitable in settings short of professional and highly qualified healthcare workers (Bockting, Williams, Carswell & Grech, 2016; Kraaij et al., 2010; van Luenen et al., 2016). There remains a significant treatment gap in Botswana, as evidence-based interventions for managing depressive symptoms among PLWH have yet to be fully developed and integrated into existing healthcare services.

### ***3. This Doctoral Dissertation***

This doctoral dissertation addresses this gap by systematically reviewing literature on self-help interventions for mental health issues among people in low-and-middle income countries, and by developing, testing, and evaluating a CBT-based booklet self-help intervention tailored for PLWH experiencing depressive symptoms in Botswana. The dissertation contributes to advancing mental health care for PLWH in Botswana by providing evidence for practical, scalable solutions for mental health issues. The scalability and low cost of self-help CBT interventions make it a good option for reaching large populations in resource-constrained environments (Bockting, Williams, Carswell & Grech, 2016). Moreover, self-help approaches may reduce stigma by offering privacy and convenience, encouraging greater uptake and adherence (Edwin, Cornwall, & Du Plooy, 2024). Additionally, this research investigates the contextual and systemic challenges to the implementation of the CBT-based self-help intervention in low-resource settings. Such an approach enables a comprehensive understanding of how to optimize intervention delivery and maximize public health impact.

#### ***3.1 Project Objectives***

The overarching aim of this doctoral research was to advance the understanding and development of scalable, effective self-help interventions for depressive symptoms among people living with HIV (PLWH), with particular emphasis on LMICs settings.

The first objective of the dissertation was to contribute to the broader body of evidence on mental health interventions in LMICs by conducting a meta-analysis of existing self-help interventions for depressive symptoms among individuals in LMICs. The meta-analysis investigated the effectiveness of both guided and unguided self-help interventions delivered in different formats (e.g., booklet, digital, etc.) and focused on the treatment of depressive symptoms and also investigated sociodemographic and clinical variables that might account for the differential effect of interventions on depressive symptoms. The meta-analysis positioned the intervention in the context of initiatives aimed at mitigating depression in LMICs and helped highlight gaps and opportunities for future research and practice.

The second objective of the dissertation was to explore correlates and risk factors for depressive symptoms among PLWH, in order to find intervention targets for depressive symptoms among PLWH in

Botswana. We also explored the mental health needs for PLWH in Botswana and conducted a feasibility assessment for a self-help intervention. The identification of specific intervention targets strengthened the evidence base and provided relevance of self-help treatment approaches and also supported the development of tailored and culturally appropriate strategies to address depressive symptoms.

Thirdly, we aimed to develop a CBT-based self-help intervention to reduce depressive symptoms among PLWH in Botswana. This phase of the dissertation was focused on the adaptation of an existing intervention and presenting the intervention and the randomized controlled trial (RCT) protocol.

The fourth objective was to empirically evaluate the effectiveness of the CBT-based self-help intervention through an RCT and to report on the effectiveness of this intervention in treating depressive symptoms among PLWH in Botswana. The effect of the intervention was examined in the short and long term. We also examined the effect of the intervention on symptoms of anxiety and determined user satisfaction with the intervention. Evaluating a self-help intervention's efficacy through a rigorous RCT provides strong evidence to support scale-up efforts and helps bridge the gap between theory and application.

Lastly, the dissertation aimed to examine implementation challenges and facilitators as well as to present an evidence-based implementation strategy for the newly developed self-help intervention to treat depressive symptoms in PLWH in Botswana. The implementation research identified practical ways to overcome real-world obstacles when adapting and implementing the intervention.

Achieving the objectives of this PhD dissertation is critical for bridging the gap between mental health needs and the availability of accessible, evidence-based services for PLWH in Botswana. The PhD project addresses a major public health challenge by focusing on depressive symptoms, one of the most prevalent yet under-recognized comorbidities among PLWH. By improving understanding and response to depressive symptoms, this study contributes directly to national efforts to enhance HIV care outcomes and overall quality of life.

The findings of this research hold significant promise for improving mental health outcomes in Botswana and other LMICs where HIV and mental health burden is the greatest. Accessible interventions that improve depressive symptoms can contribute directly to improved HIV related health outcomes including viral suppression and reduced morbidity. Together, these objectives support this comprehensive research project aimed at making meaningful improvements in the mental health and overall well-being of PLWH in Botswana.

### *3.2 Outline of the doctoral dissertation*

This doctoral dissertation comprises five interrelated peer-reviewed papers that systematically review the literature, and explore the development, evaluation, and implementation of a CBT-based self-help intervention for depressive symptoms among PLWH in Botswana. Below is a summary of each paper.

Chapter 2 contains a meta-analysis on the effectiveness of self-help interventions in the treatment of depressive symptoms in low-and-middle-income countries (LMICs). The meta-analysis investigated the pooled effect of self-help interventions for people with depressive symptoms in LMICs in the short and

long term as well as characteristics that may affect the effectiveness of these psychological interventions.

Chapter 3 investigated the correlates and risk factors associated with depressive symptoms in PLWH. In this chapter, we identified key cognitive and behavioural targets for addressing depressive symptoms in PLWH in Botswana. In addition, we explored the mental health needs of PLWH in Botswana and studied the feasibility of a culturally appropriate self-help intervention to treat depressive symptoms.

Chapter 4 describes the study protocol. The protocol outlines the background of the design of the intervention, participant eligibility criteria, recruitment strategies, intervention content and delivery methods, outcome measures, and planned statistical analyses of the RCT.

Chapter 5 presents the findings from the RCT to evaluate the effectiveness of the adapted CBT-based booklet self-help intervention to reduce depressive symptoms among PLWH in Botswana. Effectiveness was evaluated based on depressive symptom severity and anxiety symptom severity.

Chapter 6 explored the real-world challenges encountered when implementing the CBT-based booklet self-help intervention among PLWH in Botswana. Based on qualitative data from the field and researchers' experiences, this study identifies barriers such as costs, lack of screening for depressive symptoms, among others, and proposes implementation strategies to address these barriers.

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## Chapter 2

# The effectiveness of self-help interventions in the treatment of depressive symptoms in low-and-middle-income countries (LMICs): a meta-analysis



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## The effectiveness of self-help interventions in the treatment of depressive symptoms in low-and-middle-income countries (LMICs): a meta-analysis

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### ABSTRACT

**Background:** Self-help psychological interventions show great potential to close the treatment gap for depressive symptoms in low-and middle-income countries (LMICs). The current meta-analysis investigated the pooled effect of self-help interventions for people with depressive symptoms in LMICs and moderators of these psychological interventions.

**Method:** PubMed, Cochrane Register of Randomized Controlled Trials, PsychInfo, Embase, and Sabinet databases were searched between June 2021 and December 2022 to select studies that met pre-defined inclusion criteria. A coding protocol was used to retrieve and code relevant data from selected studies. We measured publication bias and assessed the study quality using the Cochrane Risk of Bias tool. The program 'Comprehensive Meta-Analysis' (CMA) was used for the data analysis. Overall effect sizes were calculated to assess the effectiveness of self-help programs for depression.


**Results:** Eighteen studies were included in the meta-analysis. Self-help interventions were found to have a medium positive effect on depressive symptoms at post-test (Hedges'  $g = 0.74$ ) and at follow-up (Hedges'  $g = 0.82$ ). There was evidence for publication bias. Larger effects were found for studies that were conducted in lower-middle income countries, had at least mild depression as inclusion criterion, reported less than 30% attrition, did not use relaxation techniques, had a low or medium risk of bias, and that used a booklet form of intervention.

**Conclusion:** This meta-analysis suggests that self-help interventions have a positive effect on people with depressive symptoms in LMICs. The findings could inform the design and implementation of mental health interventions that could prevent or treat depression.

### KEYWORDS

Meta-analysis; self-help; low-and-middle-income; depressive symptoms; interventions

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## Introduction

An estimated 280 million people suffer from depression (World Health Organization (WHO), 2023). Most people with depression are found in low-and-middle-income countries (LMICs), and with limited access treatment (Moitra et al., 2022; WHO, 2023). A mental health report by the WHO (2022), shows that mental health conditions are widespread, under-treated, and poorly addressed due to insufficient resources. There is a large discrepancy between the demand for mental health services and available trained professionals in LMICs (WHO, 2022). For instance, compared to the global average of 3.96 psychiatrists per 100,000 people in high-income countries, there are 0.04 to 0.30 psychiatrists per 100,000 people in LMICs (Rathod et al., 2017). These professionals are mostly based in urban areas and may not be accessible to those in rural areas, creating a treatment gap which is exacerbated by other factors such as poverty, conflict, social inequalities, limited budget for mental health, limited infrastructure, and low self-worth (Rathod et al., 2017).

Given the severe consequences of depression, including significant losses in health and functioning (Boulanger et al., 2009; Katon et al., 2007), and poor medication adherence (Zhou et al., 2022), it is important to address the treatment gap for depression and ensure timely access to those in need. Timely provision of treatment for depression has been directly linked to improved response rates, reduced illness and disability, and lower mortality (Bukh et al., 2013; Dominiak et al., 2021). However, traditional forms of treatment, such as face-to-face therapy or individual methods, may not be feasible for effectively addressing or treating depression in LMICs due to the barriers mentioned above.

In the past two decades, there has been an increase in research focused on self-help treatments for depressive symptoms. Self-help approaches may be guided or unguided and may be delivered in various formats, such as online or via paper manuals (Chamberlain et al., 2008). There are several advantages of self-help treatments which could make them more feasible for LMICs. Participants usually apply self-help interventions at a convenient place and time, reducing transport costs and travel time to treatment centers and giving patients privacy, which may reduce stigmatization and improve access (Ma et al., 2021). Self-help interventions do not necessarily require contact with professionals, therefore, people in LMICs could still get help despite the shortage of trained staff. Self-help interventions have been found to be effective in treating mild to severe depressive symptoms when compared to no-treatment controls in randomized controlled trials (RCTs) (Andersson et al., 2019; Cuijpers et al., 2019; Matcham et al., 2014). Thus far, most studies have been conducted in high-income countries, but there is increasing research on self-help interventions in LMICs

with promising findings (Arjadi et al., 2015; Fu et al., 2020; Martinez et al., 2018; Naslund et al., 2017).

The present study aims to systematically review the results of these studies and to perform a meta-analysis on the effectiveness of self-help interventions to treat depressive symptoms in people from LMICs. To our knowledge, there are three previous meta-analyses that investigated the effectiveness of self-help interventions for depressive symptoms in LMICs (Fu et al., 2020; Karyotaki et al., 2023; Kim et al., 2023). One of the meta-analytic studies investigated participants who experienced both depressive symptoms and substance misuse (Fu et al., 2020) and the other two studies included participants who experienced both depressive and anxiety symptoms (Karyotaki et al., 2023; Kim et al., 2023). These meta-analyses showed that digital self-help interventions were moderately effective in treating depressive symptoms. These findings are encouraging regarding the use of self-help programs for the treatment of depressive symptoms in LMICs. However, all three meta-analyses investigated only digital psychological interventions.

The current meta-analysis investigated the effectiveness of both guided and unguided self-help interventions delivered in different formats (e.g. booklet, digital, etc.) and focused on the treatment of depressive symptoms, (including depressive disorders). The current meta-analysis also aimed to investigate whether selected sociodemographic and clinical variables might account for the differential effect of the intervention on the outcome.

## **Methodology**

The study is approved as part of a larger study on (interventions for depressive symptoms) by the University of Botswana Ethics Committee and Health Research and Development Committee of the Ministry of Health in Botswana (Ref: HPDME 13/18/1).

## **Search strategy**

We used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement (Moher et al., 2009) to develop a methodological framework and protocol. Using pre-defined search terms, we searched the following databases: PsycINFO, Embase, PubMed, Cochrane Register of Randomized Controlled Trials, and SABINET African Journals. The search strategy included search words related to depression; self-help programs; various types of self-help programs and LMICs including all countries listed under LMICs (World Bank Group, 2021) (See [Supplementary appendix](#) for an overview of the search terms).

The search was conducted between June 2021 and December 2022. We did not include date as a filter; therefore, all articles ever published on the topic could be retrieved. Firstly, duplicates were removed using Zotero, a reference management tool. Secondly, titles and abstracts of relevant studies were reviewed by 4 independent researchers, each researcher screening a portion of the studies. Articles of studies that were considered relevant were retrieved for the second screening where the 4 researchers each reviewed a portion of the full articles. After the second screening, the excluded articles were screened again by a different researcher. If studies met the inclusion criteria, the articles were included in the coding process for the meta-analysis. When researchers were uncertain about including an article after the full text screening, it was discussed with the other researchers and a decision was made.

### ***Inclusion and exclusion criteria***

The inclusion criteria were: (1) evaluation of a self-help intervention; (2) treatment for depressive symptoms/disorder, (3) study participants were 16 years or older (4) study participants came from a LMIC, (5) articles were written in English, (6) the effect sizes of the collected data were clearly stated in the article and/or retrieved by the authors and/or there was pre- and post-treatment data to calculate the effect size.

Regarding the first criterion, study design could be RCT or pre-post. Studies that examined either guided or unguided forms of self-help programs were included. Regarding the second criterion, treatment had to be specifically focused on depression/depressive symptoms/disorder or listed depression, depressive symptoms, or depressive disorder as one of the primary outcome variables. Therefore, inclusion was based on what the individual studies reported as the intervention target/s or outcome/s. Regarding criterion six, the data required to calculate effect sizes included means, standard deviations, confidence intervals (CI's), and other data such as F, t and p values. Where there was no data to calculate effect sizes, we contacted the authors to obtain the information. When we did not get a response from the authors the article was excluded.

After removing duplicates, there were barely any issues related to multiplicity. If several studies reported findings from the same data, the study with the most relevant data, based on comprehensiveness of data presented in relation to the outcome variable, was included in the meta-analysis and the information from the other articles could be used to fill in gaps. Additionally, in studies that utilized several measures for depressive symptoms, the one with the most comparable and best-validated outcomes, based on psychometric properties, was selected. In cases where studies included multiple interventions and a control group (Gao et al., 2018;

Taleban et al., 2016; Tulbure et al., 2018), we included the most intensive intervention.

### **Coding and data extraction**

A coding protocol was developed and used to retrieve and code all relevant data from the selected studies ( $k=18$ ). First, a selection of articles ( $k=6$ ) was coded by two independent researchers. The mean percentage of agreement was 93% for all study features excluding the quality criteria. Thereafter, the same two researchers consulted the same articles ( $k=6$ ) to resolve the disagreements. Most of the disagreements concerned one of the researchers coding the data as missing, while the other researcher coded valid information. The remainder of the studies ( $k=12$ ) were coded by one researcher and then checked by another researcher who only looked at missing data and filled in the missing data where possible.

We retrieved and coded the following information related to the outcome variables: Cohen's  $d$  and standard deviation, lower and upper bound of the confidence interval (CI) of Cohen's  $d$ , pre- and post-test depression scores including the mean and standard deviation of the intervention group and, in case of an RCT, also of the control group. Confidence intervals were estimated using the inverse variance method.

Other relevant information retrieved and coded included the following variables: year of publication, the country and continent, which classification of LMICs (i.e. low-income country, lower-middle-income country, upper-middle-income country), journal in which the article was published, first and last year of data collection, number of participants at pre- and post-test for intervention and control group, attrition (at each time point of the study), percentage of female participants and female completers, mean age and standard deviation of age of all participants, screening criteria of the individual studies for the intervention (i.e. severe depressive symptoms at baseline, mild depressive symptoms at baseline, no screening of depressive symptoms at baseline), comorbidities of participants (i.e. people without comorbidity, people with comorbidity), intervention target (depression, depression and other), type of intervention (CBT/stress management, mindfulness), guidance (unguided, guided), type of guidance (i.e. telephone, chat, other, multiple combined methods), type of guidance provider (i.e. psychologist, trained counselor, other), content of guidance (i.e. answering questions about the self-help program, giving feedback on assignments, motivate participants, a combination), intervention duration in hours, form of the intervention (i.e. booklet, smartphone app, Internet-based, other), type of control group (i.e. waitlist-control, care as usual, psychoeducation), type of analysis (i.e. Intention to Treat (ITT), per

protocol), study quality and risk of bias (via the Cochrane Risk of Bias tool, elaborated below).

### **Moderators**

The following possible moderators were investigated: study location, first year of participant recruitment, percentage of females, intervention duration in hours, mean age, attrition percentage, intervention provider, comorbidity, intervention type, intervention target, mild to severe depressive symptoms/depression/depressive disorder at baseline as inclusion criterion, use of relaxation technique, CBT technique, stress management, motivational interviewing, whether intervention targeted a single disorder, if intervention was guided, type of guidance, content of guidance, intervention form, type of control group, type of analysis and study quality (see Table 2).

The assumptions for meta-regression were checked (normality and linearity) to perform the moderator analyses with continuous variables. However, none of the variables met both assumptions. Therefore, for statistical reasons, continuous variables were transformed into categorical variables for the moderator analysis. The categories were decided carefully based on both statistical and content-related reasons. The variable first year of recruitment was categorized into two periods based on a median split: 2013–2016 and 2017–2020. Similarly, the variable intervention duration was grouped into two categories: 0–12h and 12.1–22.6h based on a median split and mean age was categorized into 16–31.65 and 31.66–42 years, also based on a median split. The variable percentage of females was categorized into three categories: 0%–50%, 51%–75%, and 76%–100%. Finally, attrition percentage was separated into two categories: below 30% and 30% and higher.

### **Risk of bias**

The ‘Cochrane Risk of Bias assessment tool 2’ (RoB 2; Higgins & Green, 2011), was used to assess the risk of bias for RCTs. The RoB 2 assessment tool assesses the risk of bias based on five domains and another representing the sum score. The following domains were scored: (1) Randomization process, (2) Deviations from intended interventions, (3) Missing outcome data, (4) Measurement of the outcome, (5) Selection of the reported result and (6) Overall bias. The overall risk of bias is calculated by adding the results of the five domains. Based on the questions defined by the tool, the researchers rated, for each domain, whether there was: (1) low risk of bias, (2) some concerns, (3) high risk of bias. The overall risk of bias was calculated based on all the individual domains and rated: (1) low risk of bias, (2) some concerns, (3) high risk of bias.

Two people rated the risk of bias of the studies (each person rating a portion of the 18 articles). Six studies were rated by both authors and the percentage of agreement for these six studies was 98%.

### **Statistical analysis**

The program 'Comprehensive Meta-Analysis' (CMA, version 4) was used for the data analysis. Overall effect sizes were calculated to assess the effectiveness of self-help programs for depression in LMICs when compared to control groups. To measure the effect size, we calculated Hedges'  $g$  by entering relevant data in CMA which mainly included effect sizes from individual studies, standard deviations, sample sizes as well as other available data (e.g.  $F$ ,  $t$  or  $p$  values) for both the intervention and control groups. The effect sizes were classified as small (0.20–0.49), moderate (0.5–0.79) and large (0.8+) (Cohen, 1992). The overall effect size was calculated using the inverse variance method. Outliers (studies with an extremely large effect size and standardized residual  $>3$ ) were identified and adjusted by replacing them with the nearest non-outlier value (Lipsey & Wilson, 2001).

In CMA, a correlation between pre- and post-test should be indicated for each study. Since this correlation was rarely reported in study papers, this was set at 0.5 (based on Follman et al., 1992). Setting the correlation at 0.5 ensured that studies that did not report the correlation between pre- and post-test are not excluded (Follman et al., 1992). Additionally, a moderate correlation of 0.5 strikes a balance between two extremes: a correlation of 0 (no relationship between pre- and post-test scores) and 1 (perfect relationship between pre- and post-test scores).

Heterogeneity between studies was assumed; therefore, a random-effects model was adopted to calculate a pooled effect size. To measure heterogeneity among included studies,  $Q$ , and  $I^2$  statistics were calculated. A significant  $Q$  indicated significant inconsistency and heterogeneity among the studies.  $I^2$  shows the amount of heterogeneity, with an  $I^2$  of 25% representing low heterogeneity, 50% medium heterogeneity and over 75% high heterogeneity. Two-tailed  $p$ -values of  $<.05$  were used within the analysis.

A mixed effect model was used for the moderator analysis. To combine the studies in one subgroup, we applied the random effects model, and the fixed effects model was used when comparing across subgroups (Borenstein et al., 2009). We set the options for the mixed and random effects in CMA to not assume a common among-study variance component across subgroups (do not pool within-group estimates of tau-squared).

To investigate the presence of publication bias in this meta-analysis, a funnel plot and Egger's test of the intercept (Egger et al., 1997) was conducted.

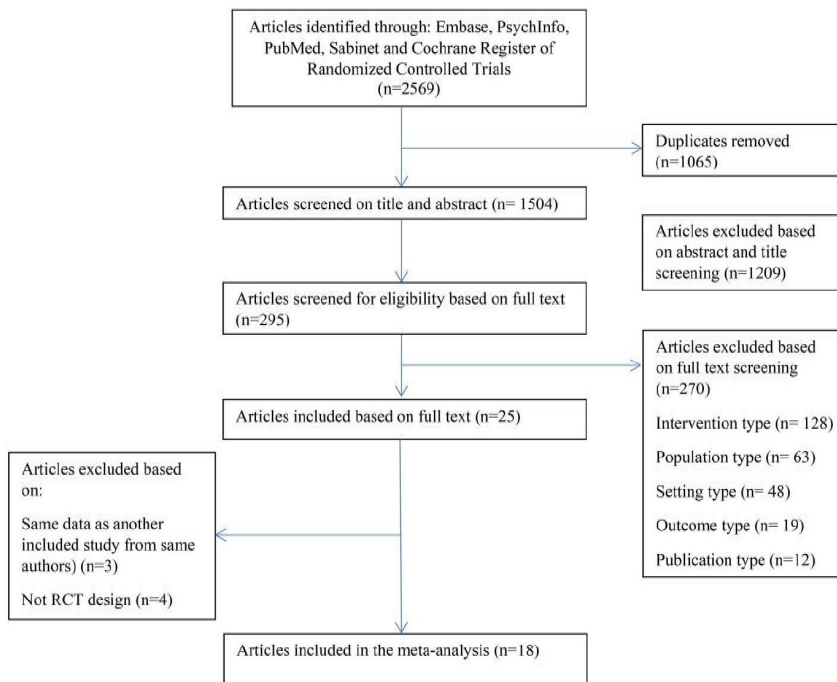
A significant Egger's test of the intercept indicated publication bias within the study. In addition, Duval and Tweedie's trim and fill analysis (2000) was used to estimate missing data due to publication bias and, when there was missing data, studies were imputed to correct this. Thereafter, an adjusted effect size was calculated.

## Results

The electronic search retrieved 2569 articles (Figure 1). A total of 1065 duplicates were removed, and 1504 articles were screened based on titles and abstracts. We removed 1209 articles based on title and abstract and screened 295 articles based on full text. In total, 25 articles met the inclusion criteria. Further screening excluded 3 articles that presented the same data as another included study from the same authors. We excluded another 4 studies that were either not randomized ( $k=2$ ) or had a pre-post design ( $k=2$ ). A total of 18 studies were included in the meta-analysis.

### *Deviation from protocol*

While the original inclusion criteria allowed for the inclusion of studies that were uncontrolled, there were too few of these types of studies in



**Figure 1.** Flow diagram of study inclusion and exclusion.

the current study to run a separate analysis and have a meaningful comparison. Therefore, the 4 studies (2 not randomized and 2 had a pre-post design) were excluded from the final analysis; thus, the final analysis was only based on RCTs.

### **Study characteristics**

Table 1 presents an overview of the characteristics of all included studies. Relatively many of the studies were conducted in China ( $k=7$ ). Other studies were conducted in Iran ( $k=2$ ), Lebanon ( $k=2$ ), Pakistan ( $k=2$ ), Colombia ( $k=1$ ), India ( $k=1$ ), Indonesia ( $k=1$ ), Romania ( $k=1$ ), and Thailand ( $k=1$ ). Regarding the recruitment period, participants were recruited between the years of 2013–2020 ( $k=12/18$ ). The mean of the mean age of participants across studies was 29 years ( $SD = 7.18$ ; range of the mean: 21 years–42 years,  $k=16$ ). Out of 15/18 studies that reported on gender distribution; two studies included only females while most (13) included females and males. The percentage of females in the included studies was on average 67.86% (range: 7.67%–100%).

Most of the studies ( $k=15/18$ ) utilized CBT/stress management and the rest of the studies utilized mindfulness ( $k=3$ ). A total of 11 interventions were guided while seven studies did not specify if the interventions were guided or unguided. A total of eight studies reported on the duration of the interventions which ranged from 2 h to 22.6 h. The most used measures of (symptoms of) depression were the Patient Health Questionnaire-9 (PHQ-9;  $k=4/18$ ) and the Beck Depression Inventory II (BDI-II;  $k=4/18$ ).

Regarding follow-up, 13/18 studies had one follow-up while the rest did not have a follow-up. Most studies had a standard care control condition ( $k=8/18$ ). A total of 3532 participants were randomized to intervention and control conditions (range 20–617;  $k=18$ ). The percentage of drop-out from the RCT studies ranged from 0% to 50.5% with a mean of 13.3% ( $k=8$ ).

### **Quality of included studies**

Figure 2 presents the quality ratings. The studies were rated based on 5 criteria of the RoB 2 as described in the method section. Regarding the overall risk of bias, ( $k=3/18$ ) studies were classified as low risk of bias, ( $k=6/18$ ) were classified with high risk and the majority (9/18) ‘some concerns’. Only  $k=2/18$  studies rated as low risk on all criteria,  $k=3/18$  studies rated low risk on all but one criterion, and  $k=4/18$  rated as high risk on 1 criterion. The rest ( $k=9/18$ ) of the studies had more than 2 scores of either 1 (some concerns) or a combination of ‘some concerns and ‘high risk’.

Table 1. Descriptive data of included articles.

Authors	Recruitment period <sup>b</sup>	N after randomization and sample description	Mean Age (SD) <sup>b</sup>	Range <sup>b</sup>	% of females <sup>b</sup>	Intervention name (N) <sup>c</sup> , type (T) <sup>d</sup> , guidance provider (G) <sup>e</sup> , duration (D) <sup>b</sup>	Control group	Primary outcome measure <sup>e</sup>	Brief description of each study results	Follow up, period of follow-up	Attrition <sup>%b</sup>
Arjadi et al. (2018), Indonesia	2016–2017	313, met the criteria for MDD or PDD	24.48 (NS)	NS	80.83	N: Guided Act and Feel Indonesia (GAF-I), T: CBT/stress management, G: Counselor, D: 5 hours	Psychoeducation platform	PHQ-9	An effect size of 0.24 for the GAF-ID group compared with the control group at 10 weeks was sustained over time (effect size 0.24 at 3 months, and 0.27 at 6 months).	Yes, 3 months, 6 months	NS
Cuijpers et al. (2022), Lebanon	2019–2020	569, had depression and impaired functioning	31.50 (8.70)	NS	58.35	N: Step-by-Step, T: CBT/stress management, G: Counselor, D: 2.5 hours	Enhanced care as usual	PHQ-9	Significant effects on depression (standardized mean differences: 0.71; 95% CI: 0.45 to 0.97) Significant effects on all outcomes were retained at 3-month follow-up.	Yes, 3 months	NS
Gao et al. (2018), China	2014	95, individuals willing to participate	31.76 (8.19)	NS	35.79	N: Present Awareness Mindfulness (PAM) and Progressive Muscle Relaxation (PMR), T: CBT/stress management, G: NS, D: NS	Waitlist control	Brief POMS	It was found that PAM and PMR are both efficacious interventions that resulted in greater reductions in perceived stress and improved mood.	Yes, 1 month	50.52
Guo et al. (2020), China	2017–2018	300, PLWH with depressive symptoms	28.30 (5.80)	NS	7.67	N: The Run for Love Intervention, T: CBT/stress management, G: NS, D: NS	Care as usual and a brochure on nutrition for PLWH	CES-D	At the 3-month follow-up, reduction in CES-D in the intervention group (from 23.9 to 17.7 vs from 24.3 to 23.8; standard effect size $d=0.66$ ).	Yes, 3 months, 6 months, 9 months	NS

(Continued)

Table 1. Continued.

Authors	Recruitment period <sup>b</sup>	N after randomization and sample description	Mean Age (SD) <sup>b</sup> Range <sup>b</sup>	% of females <sup>b</sup>	Intervention name (N) <sup>c</sup> , type (T) <sup>c</sup> , guidance provider (G) <sup>b</sup> , duration (D) <sup>b</sup>	Control group	Primary outcome measure <sup>e</sup>	Brief description of each study results	Follow up, period of follow-up	Attrition <sup>g</sup> % <sup>b</sup>
Heim et al. (2021), Lebanon	NS	138, participants with depressive symptoms.	27.30 (NS) 18–50yrs	67.39	N: Step by Step, T: CBT/stress management, G: Counselor, D: 2 hours	Psychoeducation on depression and anxiety	PHQ-9	Statistically significant symptom reduction in depression as measured with the PHQ-9 (Cohen's $d = 0.73$ ; $p = .009$ )	Yes, 3 months	NS
Ju et al. (2022), China	2020	617, had a current Kessler Psychological Distress Scale score over 22.	31.53 (9.50) NS	78.28	N: Mindfulness Intervention for Emotion distress, T: Mindfulness, G: course assistant, D: 21 hours	Waitlist	ODSIS	The intervention group had a greater increase in changes of all outcome variables ( $p < 0.001$ ) when compared to the control group.	No	NS
Kirupa et al. (2015), India	2013	20, patients who suffered from diabetic foot ulcer or venous ulcer	NS (NS) NS	NS	N: Bibliotherapy, T: CBT/stress management, G: Other, D: NS	Care as usual	BDI-II	Bibliotherapy highly proven to significant in increasing quality of life ( $F = 20.3, P < 0.001$ ), decreasing the psychological distress ( $F = 25.2, P < 0.01$ ) and decreasing depression ( $F = 5.18, P < 0.05$ ).	Yes, 14 days and 21 days	0
Latif et al. (2021), Pakistan	2019–2019	39, individuals with depressive symptoms	34.44 (NS) NS	53.85	N: Culturally adapted CBT-based guided self-help 'Kushi or Khatoon', T: CBT/stress management, G: NS, D: NS	Care as usual	HADS	Preliminary evaluation of a culturally adapted CBT-based online programme for depression found to be feasible and acceptable to Pakistani patients with anxiety and depression.	Yes, 12 weeks	0

(Continued)

**Table 1.** Continued.

Authors	Recruitment period <sup>b</sup>	N after randomization and sample description	Mean Age (SD) <sup>b</sup>	% of females <sup>b</sup>	Intervention name (N) <sup>c</sup> , type (T) <sup>d</sup> , guidance provider (G) <sup>e</sup> , duration (D) <sup>b</sup>	Control group	Primary outcome measure <sup>e</sup>	Brief description of each study results	Follow up, period of follow-up	Attrition% <sup>b</sup>
Liu et al. (2021), China	2020	125, mothers who were primary caregivers of preschool children diagnosed with autism	32.89 (3.68) NS	100	N: Joint Attention Symbolic Play, Engagement and Regulation Online course, T: CBT/stress management, G: Counselor, D: 22.60 hours	Care as usual	SDS	statistically significant group×time interaction effects for the intervention on depression (F=26.563, P<.001).	Yes, 20weeks	NS
Ma et al. (2018), China	NS	96, volunteers without identified mental illness.	27.84 (NS) 18–47 y	NS	N: Self-direct based mindfulness-intervention (SDMBI) T: Mindfulness, G: NS, D: 16h	Waitlist	SDS	Results showed that participants had significant pre- and post-test differences on mindfulness, emotion regulation difficulties, and psychological distress, with medium to large effect sizes.	No	33.33
Naeem et al. (2014), Pakistan	NS	192, patients with depression	NS (NS) NS	NS	N: Self-help book, based on CBT methods and culturally adapted, T: CBT/stress management, G: family/hospital staff, D: 5h.	Care as usual	HADS	CaCBT based self-help found to be effective when compared to care as usual in reducing the symptoms of depression and anxiety, as well as somatic symptoms and disability.	No	4.69
Perera et al. (2020), Colombia	2016–2017	214, college students with mild to moderately severe depressive symptoms	22.15 (4.70) 18–52 y	71.50	N: Colombian iCBT: Yo puedo sentirme bien/I can feel better, T: CBT/stress management, G: Counselor, D: NS.	Waitlist	PHQ-9	There were significant effects post treatment for the intervention group, maintained at 3-month follow-up	Yes, 3 months	NS

(Continued)

Table 1. Continued.

Authors	Recruitment period <sup>b</sup>	N after randomization and sample description	Mean Age (SD) <sup>b</sup> Range <sup>b</sup>	% of females <sup>b</sup>	Intervention name (N) <sup>c</sup> , type (T) <sup>c</sup> , guidance provider (G) <sup>c</sup> , duration (D) <sup>b</sup>	Control group	Primary outcome measure <sup>e</sup>	Brief description of each study results	Follow up, period of follow-up	Attrition <sup>g</sup> % <sup>b</sup>
Shahsavani et al. (2021), Iran	2018	102, pregnant women; medium score range, depression, anxiety, and stress	28.40 (NS) 18–35 y	100	N: I-GSH-CBT intervention, T: CBT/stress management, G: Counselor, D: NS.	Care as usual	DASS-42	Implementing the I-GSH-CBT significantly reduced CBF, DASS-42 scores.	No	NS
Songprakun and McCann (2012), Thailand	NS	56, individuals with moderate depression	42 (9.72) 18–58 y	73.21	N: The Good Mood Guide: A self-help manual for depression, T: CBT/stress management, G: NS, D: NS.	Care as usual	CES-D	At post-test, the distress scores of the intervention group lower than the control group. Post-test to 1-month follow-up, distress scores decrease steadily in the intervention group but only slightly in the control group. depressive symptoms less intense post-treatment ( $F=12.30$ , $p<.001$ ).	Yes, 1 month	3.57
Taleban et al. (2016), Iran	NS	203, individuals with depressive symptoms	39.83 (NS) NS	93.60	N: Bibliotherapy and text messaging, T: CBT/stress management, G: NS, D: NS.	NS	BDI-II	Significant differences found among the three conditions at post-intervention (Cohen's $d$ between 0.45 and 1.89).	Yes, 6 months	11.39
Tulbure et al. (2018), Romania	2014	79, individuals with current diagnosis of MDD or dysthymia	32.05 (NS) NS	82.28	N: iCBT intervention (Conventional CBT and Religious CBT), T: CBT/stress management, G: Psychologist, D: NS.	Waitlist	BDI-II	Significant differences found among the three conditions at post-intervention (Cohen's $d$ between 0.45 and 1.89).	Yes, 6 months	11.39

(Continued)

Table 1. Continued.

Authors	Recruit-ment period <sup>b</sup>	N after randomization and sample description	Mean Age (SD) <sup>b</sup>	% of females <sup>b</sup>	Intervention name (N) <sup>c</sup> ; type (T) <sup>d</sup> ; guidance provider (G) <sup>e</sup> ; duration (D) <sup>b</sup>	Control group	Primary outcome measure <sup>e</sup>	Brief description of each study results	Follow up, period of follow-up	Attrition <sup>g</sup> % <sup>h</sup>
Ying et al. (2023), China	2020	194, Chinese residents with CES-D score of $\geq 16$ .	40.15 (NS)	62.37	N: Healthy Psychological Station, Clinician-guided ICBT; T: CBT/ stress management, G: Counselor, D: NS	Waitlist	CES-D	ICBT participants had greater reductions on all the outcomes compared to the waitlist group at post-intervention (PHQ-9) at and at follow-up ( $d=0.12$ ) and the CES-D at post-intervention ( $d=0.06$ ), compared to the CBT group.	No	NS
Zhao et al. (2022), China	NS	182, students with at least mild depressive symptoms	21.76 (NS)	52.75	N: iACT, T: Mindfulness, G: NS, D: 3 hours	Waitlist	BDI-II	The iACT group showed significantly more improvement in depressive symptoms ( $d=1.27$ ) both at T1 and T2 and compared with the waitlist control group.	Yes, 3 months	NS

<sup>a</sup>RCT: Randomized Controlled Trial.<sup>b</sup>NS: Not stated.<sup>c</sup>MDD: Major depressive disorder; PDD: Persistent depressive disorder; PLWH: people living with HIV.<sup>d</sup>iACT: internet-based Acceptance and Commitment Therapy; iCBT: Internet based cognitive behavioral therapy; IGSHCBT: Internet based guided self-help CBT.<sup>e</sup>HADS: Hospital Anxiety and Depression Scale; CES-D: Center for Epidemiologic Studies Depression Scale; DASS: Depression anxiety stress scale; HADS: Hospital Anxiety and Depression Scale; ODSIS: Overall Depression Severity and Impairment Scale; PHQ-9: Patient Health Questionnaire-9; POMS: Profile of Mood State; SDS: Self-rating Depression Scale.

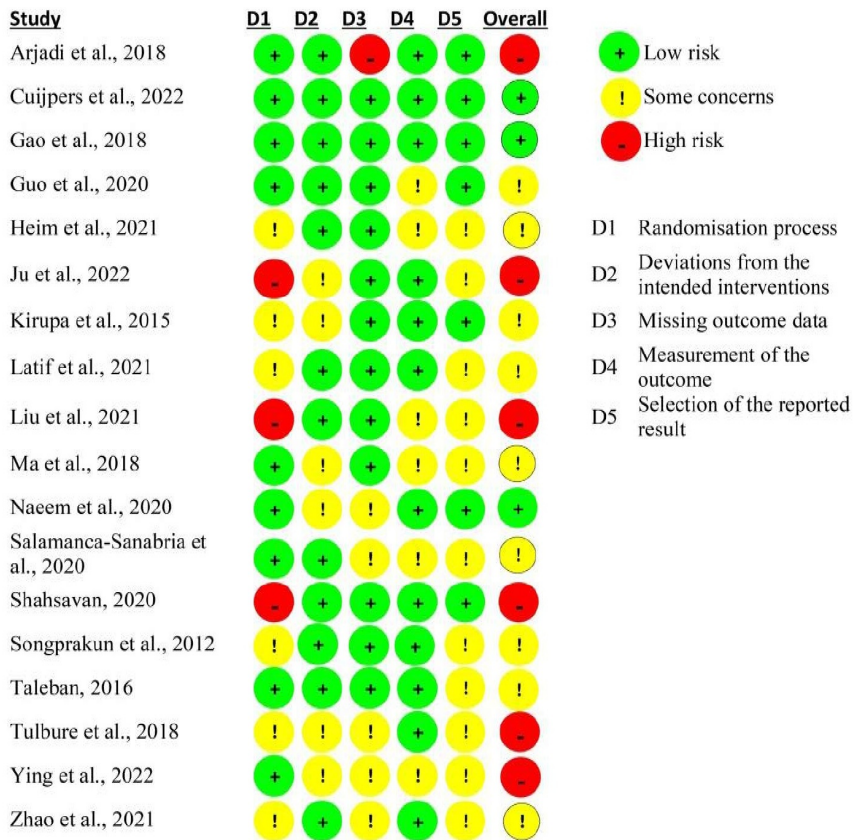


Figure 2. Quality of included Studies.

### Main hypothesis: intervention effectiveness

The overall effect size of self-help programs ( $k=18$ ) on the improvement of depressive symptoms in LMICs was Hedges'  $g = 0.74$ , 95% CI [0.59, 0.89],  $p < .001$  (Figure 3). This result represents a moderate effect size according to the classification of Cohen (1992). The effect sizes for the individual studies ranged between small ( $k=5/18$ ), moderate ( $k=7/18$ ) and large ( $k=6/18$ ). We identified 1 outlier (Latif et al. (2021)) and replaced it with an effect size of 2.10 with  $SE = 0.39$  (Lipsey & Wilson, 2001). Additionally, heterogeneity was substantial and significant ( $Q=89.48$ ,  $p < .001$ ,  $I^2=81\%$ ). This result suggests that not all studies in the analysis shared a common effect size.

Regarding follow-up period ( $k=11$ ), the overall effect size was somewhat larger with overall Hedges'  $g = 0.82$ , 95% CI [0.63, 1.01],  $p < .05$  (Figure 4). The effect sizes for the individual studies based on follow-up results ranged between small ( $k=1/11$ ), medium ( $k=4/11$ ) and large ( $k=6/11$ ).

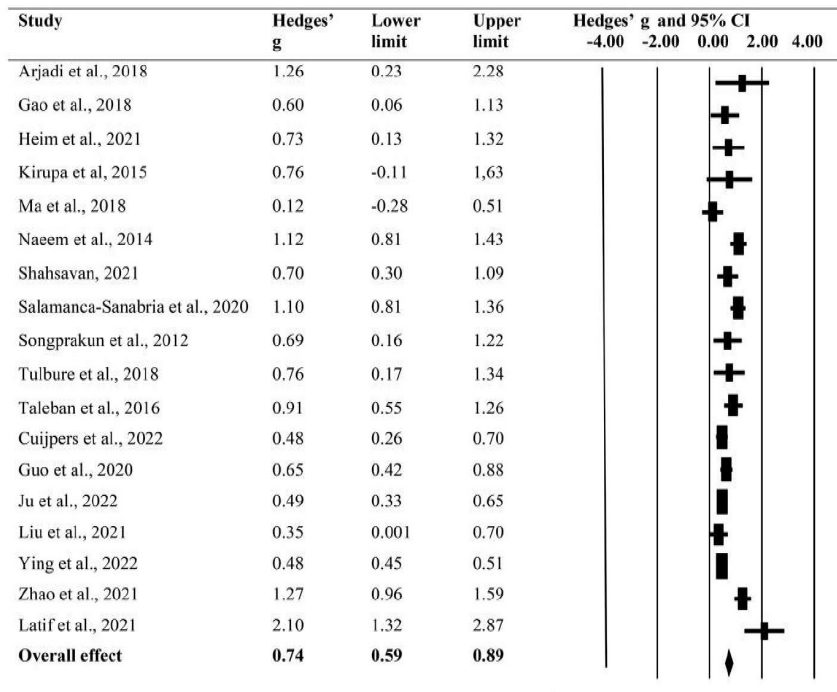


Figure 3. Intervention effect sizes – Pre-test-post-test.

### Publication bias

The funnel plot was inspected and clearly showed that studies were missing on the left side of the plot (Figure 5), suggesting publication bias. Egger's regression test of the intercept was performed and found to be significant (Hedges'  $g = 1.60$ , 95% CI [0.50, 2.70],  $t(16) = 3.08$ ,  $p = .01$ ), also suggesting publication bias. Furthermore, we performed Duval and Tweedie's trim and fill analysis which showed that 7 studies needed to be filled on the left side of the plot (as shown by black dots in Figure 5). After filling the 7 missing studies, the adjusted effect size was Hedges'  $g = 0.48$ , 95% CI [0.45, 0.51]. Overall, there appears to be evidence of publication bias in this meta-analysis; studies with smaller effect sizes are missing.

### Moderators of intervention effect

Table 2 presents the results of the moderator analysis. The point estimate Hedges'  $g$  was retrieved from the mixed effects analysis and the  $Q$  statistic indicated whether there is a difference between the subgroups. The results regarding study location (categories: lower-middle-income and upper-middle-income [ $k = 18$ ]) showed a larger effect size for studies conducted in lower-middle-income countries and heterogeneity was significant. Similarly, we found that studies that had 'at least mild depression at baseline' as an

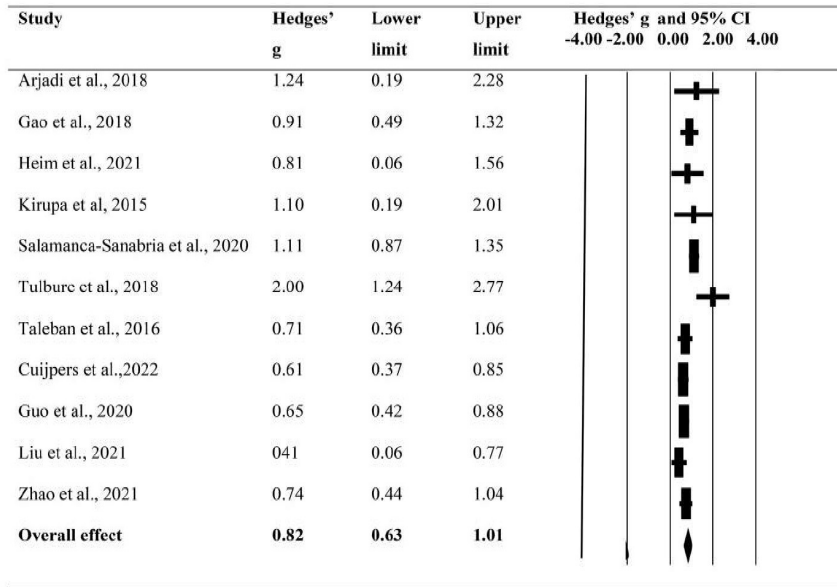
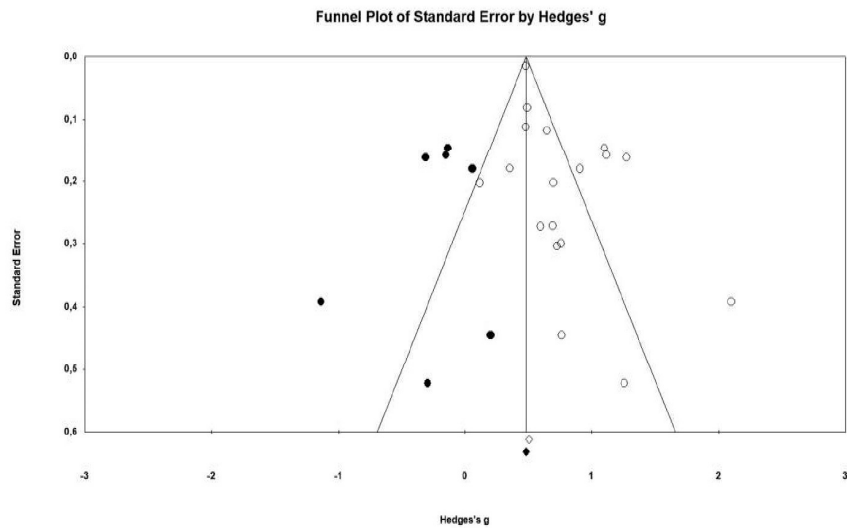


Figure 4. Intervention effect sizes- follow-up.



#### Key

- Added by Trim and Fill
- Included studies

Figure 5. Funnel plot of standard error by Hedges' g.

inclusion criterion (compared to no baseline score for depressive symptoms or only severe depression at baseline as inclusion criterion) showed a larger effect size ( $k=18$ ) and heterogeneity was significant.

**Table 2.** Moderators of intervention effect on depression.

Moderator	Subgroup	<sup>a</sup> k	Hedges' g	<sup>b</sup> 95%CI	<sup>c</sup> Q for difference
Location	Lower middle income	8	0.95	0.69, 1.21	4.20*
	Upper middle income	10	0.63	0.47, 0.79	
First year of recruitment	2007–2016	6	0.82	0.60, 1.04	3.47
	2017–2020	6	0.56	0.39, 0.72	
Percentage of females	0%–50%	2	0.64	0.43, 0.85	2.33
	51%–75%	7	0.90	0.59, 1.22	
	76%–100%	6	0.63	0.43, 0.82	
Intervention duration	0–12 hours	3	0.95	0.29, 1.61	2.60
	12.1–22.6 hours	3	0.38	0.18, 0.59	
Mean age	0–31.65 years	9	0.71	0.48, 0.93	0.02
	31.66–42 years	7	0.74	0.46, 1.01	
Attrition percentage	Below 30%	6	1.02	0.71, 1.33	5.95**
	30% and above	2	0.32	–0.14, 0.79	
Intervention provider	Psychologist	1	0.76	0.17, 1.34	1.50
	Trained counselor	7	0.64	0.44, 0.84	
	Other	4	0.99	0.45, 1.53	
Comorbidity	Without comorbidity	14	0.72	0.55, 0.90	0.32
	With comorbidity	4	0.81	0.55, 1.07	
Intervention type	CT/Stress management	15	0.77	0.60, 0.94	0.20
	Mindfulness	3	0.63	0.06, 1.21	
Intervention target	Depression	9	0.77	0.55, 0.99	0.07
	Depression and other	9	0.73	0.45, 1.00	
Depression at baseline as inclusion criterion	No depression/depressive symptoms/disorder	5	0.46	0.38, 0.54	14.00*
	Yes, at least mild depressive symptoms	10	0.89	0.66, 1.11	
	Yes, clinical diagnosis	3	0.79	0.42, 1.16	
Relaxation technique	No	11	0.91	0.68, 1.15	8.72*
	Yes	7	0.50	0.36, 0.65	
CBT technique	No	5	0.68	0.17, 1.18	0.10
	Yes	13	0.76	0.60, 0.92	
Stress management technique	No	9	0.78	0.56, 1.00	0.20
	Yes	9	0.71	0.51, 0.91	
MI technique	No	16	0.77	0.60, 0.94	3.58
	Yes	2	0.51	0.30, 0.72	
Meditation technique	No	11	0.86	0.63, 1.09	2.10
	Yes	7	0.60	0.35, 0.86	
Intervention single disorder	Only depression intervention	11	0.73	0.53, 0.92	0.13
	Depression and other disorder intervention	7	0.80	0.47, 1.12	
Intervention guided	Unguided	4	0.84	0.45, 1.23	0.17
	Guided	13	0.75	0.58, 0.92	
Type of guidance	Telephone	2	1.37	–0.01, 2.75	0.85
	Chat	3	0.74	0.34, 1.13	
	Other	1	0.70	0.30, 1.09	
	Multiple combined methods	3	0.77	0.31, 1.23	
Guide content	1.Answer questions (about self-help program)	3	1.01	0.24, 1.78	6.27
	2.Give feedback on assignments	2	0.72	0.39, 1.05	
	3.Motivate participants	1	0.91	0.55, 1.23	
	Both 1&2	1	1.26	0.23, 2.28	
	Both 2&3	1	1.10	0.81, 1.40	
	Both 1&3	4	0.66	0.39, 0.93	
Intervention form	Booklet	2	1.02	0.79, 1.26	24.01*
	Smartphone app	5	0.48	0.45, 0.51	
	Audiotape	1	0.60	0.06, 1.13	
	Internet based	5	0.95	0.47, 1.43	
	Waiting list	7	0.68	0.45, 0.92	
Control group	Standard care	8	0.77	0.51, 1.03	0.48
	Psychoeducation	2	0.86	0.35, 1.38	
	ITT <sup>d</sup>	10	0.82	0.61, 1.03	
Analysis type	Per protocol	2	0.70	0.38, 1.01	4.01
	Both 1 and 2	3	0.52	0.32, 0.72	

(Continued)

**Table 2.** Continued.

Moderator	Subgroup	<sup>a</sup> k	Hedges' g	<sup>b</sup> 95%CI	<sup>c</sup> Q for difference
Cochrane total score	Low risk	3	0.73	0.29, 1.18	8.70
	Some concerns	9	0.89	0.60, 1.18	
	High risk	6	0.48	0.45, 0.51	

<sup>a</sup>k = number of studies (studies that didn't report about the moderator are left out of the analysis).

<sup>b</sup>Lower and upper limit of 95% Confidence Interval.

<sup>c</sup>Q for differences between subgroups.

<sup>d</sup>ITT: Intention to Treat.

\*Significant moderator ( $p < .01$ ).

\*\*Significant moderator ( $p < .05$ ).

Additionally, the results regarding attrition (categories: below 30%; 30% and above [ $k=8$ ]) showed a larger effect size for studies that reported less than 30% attrition and heterogeneity was significant. Interventions that did not include relaxation techniques (categories: no, yes [ $k=18$ ]) had a larger effect size and heterogeneity was significant. Intervention form was also a significant moderator (categories: booklet; smartphone app; Internet-based; audiotape [ $k=13$ ]). The results showed the largest effect size for studies that used the booklet form of interventions and heterogeneity was significant. Internet-based interventions also had a large effect. There were no significant differences between the subgroups regarding the rest of the moderators that were investigated.

## Discussion

This meta-analysis examined studies that used self-help psychological interventions to address depressive symptoms amongst 3532 participants in LMICs. Our first aim was to investigate the effectiveness of these interventions. A total of 18 studies with an RCT design were included in the meta-analysis.

We found that participants who took part in these interventions reported significantly lower levels of depressive symptoms at both post-test and follow-up compared to those in the control groups, with moderately high effect sizes. The effect sizes found in this meta-analysis were comparable to those reported in other recent meta-analyses (Fu et al., 2020; Karyotaki et al., 2023; Kim et al., 2023). However, we identified evidence of publication bias, which led to a smaller corrected effect size.

Our second aim was to determine if certain characteristics of the participants, studies, or interventions influenced the effects of the interventions. We identified five significant moderators: study location (study characteristic), mild depressive symptoms at baseline as inclusion criterion (study characteristic), attrition (study characteristic), use of relaxation technique (intervention characteristic), and intervention form (intervention characteristic). Our findings revealed that interventions conducted in

lower-middle-income countries had a larger effect size compared to those conducted in upper-middle-income countries. To date, no studies have extensively studied the disparities between lower and upper middle-income countries regarding the effectiveness of psychological interventions.

Another significant moderator was mild depressive symptoms as an inclusion criterion. Studies that included participants who had at least mild depressive symptoms, yielded large effect sizes while those that included only participants with severe depression yielded moderate effect sizes. Studies that did not screen for depression at baseline yielded a small effect size. A recent systematic review by Elias et al. (2024) found that high baseline depression severity influenced treatment response. Such findings emphasize the importance of screening for depressive symptoms at baseline.

The findings of this meta-analysis also showed that attrition may influence intervention effects. We found that studies with less than 30% attrition had a larger effect size. Similarly, Forbes et al. (2023) found that when patients engaged more with interventions their symptoms significantly improved. These results suggest that the longer participants are retained in the interventions, the better the outcome.

Another significant moderator was the use of relaxation exercises in interventions to reduce depressive symptoms. Studies using this technique had significantly smaller effect size. This aligns with Furukawa et al. (2021), who discussed that including relaxation techniques in depression interventions might not be beneficial. Intervention format was another significant moderator in the current meta-analysis. The results showed a large effect size for studies that used the booklet format or internet-based interventions, compared to interventions using smartphone applications. We did not find literature comparing the effectiveness of the booklet format of interventions with internet, smartphone apps or other formats in LMICs. The effect of internet-based interventions in reducing depressive symptoms in our study is larger in comparison to previous research (Fu et al., 2020; Karyotaki et al., 2023; Kim et al., 2023).

Other factors, such as the use of CBT techniques, did not moderate intervention effect in the current meta-analysis. This finding is inconsistent with a previous meta-analysis that found the use of CBT techniques to improve intervention effect (e.g. Vally & Maggott, 2015). The use of guidance within self-help interventions was not found to be a moderator in the current meta-analysis, which varies from other studies (Bennett et al., 2019; Ye et al., 2014).

### **Limitations**

This meta-analysis has several limitations. First, the evidence of publication bias, potentially indicated that studies with smaller effect sizes

were not included in the analysis. Therefore, while our results are encouraging, they should be interpreted with caution. Second, we only included studies published in English, potentially excluding studies published in other languages in LMICs which may have influenced the publication bias. Third, there was heterogeneity in the measures used to assess for depressive symptoms across studies. Fourth, some of the studies included did not screen for depression at baseline. The findings, however, show that it is more useful to enroll people with depressive symptoms, regardless of severity, in psychological interventions for depression than to enroll people who may not have depressive symptoms. Another limitation of the current study is that the meta-analysis only analyzed and reported data from RCTs, making comparisons with other study designs difficult. Furthermore, we only included peer-reviewed studies published in academic journals. It is likely that due to barriers to publishing in international peer-reviewed journals, particularly for researchers or practitioners in LMICs, our analysis may have missed important findings. In addition, the studies in the meta-analysis were categorized as low, medium or high risk of bias. The majority of the studies were categorized as medium risk, meaning that high-quality studies are needed to draw robust conclusions regarding the effects of self-help interventions in LMICs.

### ***Positive aspects***

The positive aspects of this study include that it is one of the few meta-analyses conducted on self-help interventions in LMICs. Secondly, it is timely considering the growing burden of depressive symptoms, emphasizing the importance of immediate treatment. Additionally, the findings of this study could encourage further research on self-help interventions and their effects on mental health outcomes in LMICs. Moreover, these results highlight the potential for integrating cost-effective self-help interventions into clinical practice, thus reducing the need for extensive human resources.

### ***Recommendations for future research***

Based on the results of this meta-analysis, we recommend that future studies should focus on performing and publishing high-quality studies that assess the effectiveness of self-help interventions. These studies should move beyond piloting to implementing interventions at a large scale and integrating them into routine care. LMICs should prioritize research funding and cover publication fees, especially in Africa where the population suffering from depression is growing and there is a lack of studies on this topic.

Additionally, we recommend screening for depressive symptoms at baseline as a critical step in interventions for depression in LMICs. This will ensure that only those with depressive symptoms are enrolled in the interventions and can benefit from them. It would be especially beneficial for future studies to compare the effectiveness of interventions that use the same standardized measurement tools for evaluation of depressive symptoms. It is important that these tools are comparable validated measures. Future studies should also investigate the reasons for high attrition in self-help interventions to retain more participants and improve mental health outcomes, thus increasing the power of the studies. Regarding the format of interventions, it is recommended to further explore booklet or internet-based formats as well as specific aspects of guidance (e.g. providing feedback, motivation, and clarification) or no guidance that might improve intervention effects.

The inconsistent findings regarding the use of relaxation techniques suggest the need for further research in this area. It is premature to exclude relaxation techniques since previous studies have recommended them for the treatment of depressive symptoms (e.g. Jorm et al., 2008; Li et al., 2020; Nicolussi et al., 2016). Lastly, future studies could investigate specific components of CBT techniques or other treatment modalities to identify components that are more effective in treating depressive symptoms.

## **Conclusion**

The aim of this meta-analysis was to examine the effectiveness of self-help psychological interventions in reducing depressive symptoms in participants in LMICs. We also investigated moderators of intervention effect. Overall, self-help psychological interventions had a moderately high effect on the treatment of depressive symptoms. Effectiveness was related to the income status of the country, mild depressive symptoms at baseline as inclusion criterion, intervention format, not using a relaxation technique and low attrition. We recommend further research that can inform mental health policies to disseminate and scale up psychological interventions in LMICs.

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## **Disclosure statement**

No potential conflict of interest was reported by the author(s).

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## Chapter 3

# Intervention targets for people living with HIV and depressive symptoms in Botswana



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## Research Article

# Intervention targets for people living with HIV and depressive symptoms in Botswana

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**Background:** The prevalence of HIV in Botswana is high. Many people living with HIV (PLWH) suffer from depressive symptoms and have inadequate coping skills. Most PLWH do not receive adequate psychological treatment. Empirically based interventions for PLWH with depressive symptoms in Botswana should be developed, with a focus on improving coping skills. The present study was a first step towards this goal, by trying to identify targets for intervention. The study aimed to provide prevalence rates of depression among PLWH in Botswana, to assess their mental health treatment needs and wishes as expressed by themselves, and to study the relationships between cognitive and behavioural coping strategies and depressive symptoms.

**Method:** A cross-sectional study was conducted. The sample consisted of 291 participants (73% female) from 8 HIV treatment centres from Botswana. Participants completed standardized questionnaires on depressive symptoms (CES-D) and coping skills (CERQ, BERQ). They also answered questions regarding their mental health care needs and wishes.

**Results:** In total 43.4% of participants reported clinically significant depressive symptoms. The majority of participants indicated that they needed help with the following topics: feelings of depression, physical tension, finding new goals and coping with HIV. In addition, they indicated preferring a self-help programme in booklet format. Multiple regression analyses showed that the following coping strategies had significant relationships with depressive symptoms: rumination, catastrophising, withdrawal, positive refocusing and refocus on planning (the latter two negatively).

**Conclusion:** Almost half of the PLWH reported depressive symptoms that were clinically significant. The findings suggested that an intervention for PLWH with depressive symptoms in Botswana should preferably be a self-help programme presented in booklet format. With regard to content, the results confirmed that the intervention should focus on specific coping skills. In addition, elements like goal finding and strategies to reduce physical tension should be added.

**Keywords:** Africa, coping skills, depression, goal finding

## Introduction

Botswana's HIV prevalence rate ranks at the higher end globally (UNAIDS, 2017). Although Botswana has made enormous progress in providing free antiretroviral therapy (ART) to people living with HIV (PLWH), the mental health consequences of living with the disease have not been adequately addressed yet (Lewis, Mosepele, Seloilwe & Lawler, 2012).

From studies in countries other than Botswana we know that PLWH face many psychological challenges that may complicate their illness, such as depression and anxiety (Kaneez, 2016; Sikkema, Dennis, Watt, Choi, Yemeke, & Joska, 2015). Studies in sub-Saharan African countries increasingly point to depression as the leading mental illness among PLWH (Breuer, Myer, Struthers & Joska, 2011; Nel

& Kagee, 2013; Abas, Ali, Nakimuli-Mpungu & Chibanda, 2014). Conclusive figures for the prevalence of depression of PLWH living in sub-Saharan Africa cannot yet be given, because they vary widely across studies. For example, a systematic review and meta-analysis on PLWH living in sub-Saharan Africa, which includes the results of 66 previous papers, reported pooled prevalence rates of depressive disorder that ranged between 9% and 32%, depending on the measurement instrument and whether or not they were on ART (Bernard, Dabis & Rekeneire, 2017). Concerning gender differences, it has been found that females were more likely to report depressive symptoms than men in this region (Nyirenda, Chatterji, Rochat, Mutevedzi & Newell, 2013; Seth et al., 2014). Only one study specifically reported on the prevalence rates of depression among PLWH in Botswana. Lawler and colleagues (2011) used two separate instruments

to investigate the incidence of depression among PLWH in Botswana. Depending on the instrument, they found that 24% (Beck Depression Inventory-Fast Screen) and 38% (Prime Mental Disorders Mood Moodlet) of the participants fulfilled the criteria for depressive disorder, with women reporting higher mean depressive symptom scores than men.

In conclusion, thus far hardly any attention has been paid to the prevalence of depressive symptoms in PLWH in Botswana, let alone for their mental health treatment needs. Some reasons for the limited attention to mental health of PLWH in Botswana include lack of a clearly defined mental health system, lack of specific diagnostic tools and lack of specific treatment programmes for the mental health problems in the HIV population (Lewis et al., 2012). Nevertheless, the figures mentioned earlier suggest that depression might be an important obstacle for PLWH in Botswana. Therefore, as a first aim, the present study will investigate the prevalence rate of clinically significant depressive symptoms of PLWH in Botswana.

From other countries we already know that depression among PLWH can be an important predictor of treatment failure, poor quality of life, disease progression and at worst mortality (Marwick & Kaaya, 2010; Breuer et al., 2011; Lewis et al., 2012; Abas et al., 2014; Sikkema et al., 2015). Treatment of depression among PLWH in Botswana is therefore important, given these potential consequences for health and well-being. A search for systematically integrated treatment programmes for depression or other mental health issues for PLWH in Botswana did not reveal any results. Looking at other countries in sub-Saharan Africa, only two examples of specific intervention programmes for PLWH were found. First, Nakimuli-Mpungu and colleagues (2015) in Uganda and Petersen, Hanass Hancock, Bhana and Govender (2014) in South Africa found that an eight-week group-based intervention for PLWH was effective in reducing depressive symptoms. Second, in Tanzania, Kaaya and colleagues (2013) found that a six-week intervention programme helped to reduce depressive symptoms among PLWH in the intervention group compared with participants in the control group. Both programmes were delivered in groups, made use of cognitive behaviour therapy techniques, focused on coping and stress/problem management, behavioural activation techniques and skills training, and used support groups to improve mental health outcomes (Kaaya et al., 2013; Petersen et al., 2014; Nakimuli-Mpungu et al., 2015). Moreover, these interventions were delivered by lay counsellors (Petersen et al., 2014) and community health workers (Sikkema et al., 2015).

If we look at Western countries, more examples of effective intervention programmes for PLWH with depressive symptoms can be found (Olatunji, Mimiaga, O'Cleirigh, & Safren, 2006; Brown & Venable, 2008; Carrico & Antoni, 2008; Crepaz et al., 2008; Scott-Sheldon, Kalichman, Carey & Fielder, 2008; Kraaij et al., 2010; Sherr, Lucas, Harding, Sibley & Catalan, 2011; van Luenen, Garnefski, Spinhoven, & Kraaij, 2018). Most of these programmes employed techniques from the cognitive-behavioural approach, consisted of multiple sessions and were delivered face to face individually or in small groups. They generally focused on the reduction of stress and the facilitation of adaptive coping skills (including changing of

maladaptive cognitions and behaviours) (Brown & Venable, 2008; Molassiotis et al., 2002).

Given the lack of psychological intervention programmes for PLWH in Botswana, it is crucial to gain knowledge on what kind of programme would match the problems and needs of PLWH and depression in Botswana. Therefore, the second aim was to assess the treatment needs and wishes of PLWH in Botswana, as expressed by themselves. No information could be found on this topic in the literature.

Previous studies clearly showed that depressive symptoms among PLWH are often significantly related to maladaptive coping skills (Abas et al., 2014; Gore-Felton et al., 2006; Kaneez, 2016). As a consequence, coping skills have generally been included as an important target in previous psychological interventions for PLWH (e.g. Kraaij et al., 2010; van Luenen et al., 2018). The third aim of the present study was to examine which specific coping strategies are related to depressive symptoms in PLWH in Botswana. This will provide information that can help to shape the content of possible interventions.

Coping is generally defined as the conscious cognitive or behavioural strategies employed by individuals when responding to stress (Lazarus & Folkman, 1984). Cognitive coping strategies that have been distinguished in the literature are blaming oneself, rumination, catastrophising, blaming others, acceptance, planning, positive reappraisal, positive refocusing, and putting into perspective (Garnefski & Kraaij, 2007). With regard to PLWH, research evidence has shown that 'maladaptive' cognitive strategies such as self-blame, rumination and catastrophising were associated with higher levels of depressive symptoms in PLWH in the Netherlands (van der Veek, Kraaij, van Koppen, Garnefski, & Joekes, 2007; Kraaij et al., 2008). In contrast, 'adaptive' strategies such as positive refocusing, positive reappraisal and putting into perspective were associated with lower levels of depression in PLWH (Kraaij et al., 2008).

Behavioural coping strategies that have been distinguished in the literature are: seeking distraction, actively approaching, seeking social support, withdrawal and ignoring (Kraaij & Garnefski, 2019). With regard to PLWH, previous research has shown that especially active and problem-focused coping were associated with lower levels of depressive symptoms (Kraaij et al., 2008; Kotzé, Visser, Makin, Sikkema, & Forsyth, 2013).

In summary, the present study had three main aims. First, the study aimed to provide new figures on the prevalence of clinically significant depressive symptoms among male and female PLWH in Botswana. Based on previous research, we hypothesised that between 24% and 38% of the participants would obtain scores that are indicative of clinically significant depressive symptoms, with females showing higher rates. Second, the study aimed to assess the treatment needs and wishes of PLWH in Botswana, as expressed by themselves. No hypotheses could be formulated here due to the novelty of the question. Third, the study aimed to investigate the relationships between specific cognitive and behavioural coping strategies and depressive symptoms among PLWH in Botswana, in order to find specific intervention targets. Based on previous research, we expected that coping strategies such as rumination, catastrophising and self-blame would be positively related to depressive

symptoms among PLWH in Botswana whilst adaptive coping strategies, such as positive refocusing, putting into perspective, refocus on planning and active coping, would be negatively related to depression.

## Methods

### Sample and procedures

A total of 306 PLWH were recruited from eight HIV treatment centres around Botswana (Princess Marina Hospital's Infectious Disease Control Centre (IDCC); Selibe-Phikwe Government Hospital; Botshabelo (IDCC); Kagiso IDCC; Tapologong clinic; Nyangabwe Referral Hospital (IDCC); Kasane Primary Hospital (IDCC); and Plateau clinic). These research sites were selected strategically, because together they serve some of the highest HIV-prevalent areas in the country (Statistics Botswana, 2017) and thereby provide a fairly representative sample of the HIV population in this country.

The inclusion criteria were PLWH aged 18 years and over and having sufficient knowledge of Setswana and/or the English language. At the treatment sites, participants were selected through the use of convenience sampling. During morning prayers, the nursing staff briefly explained the study to the participants and invited potential participants to take part in the study. It was explained that participation was anonymous and voluntary and that those who volunteered could withdraw at any point without consequences. Potential participants volunteering to participate in the study were then given more information about the study and asked to sign a consent form. Participants then completed a questionnaire in Setswana or English while waiting for their appointment or after their appointment with the doctors. During visits, patients are expected to wait in a queue before being attended to by a medical practitioner. To maintain privacy during data collection, a room was prepared for the participants at the hospital where they completed their questionnaire. Some participants, however, preferred to complete their questionnaire while queuing. Furthermore, participants who could not read or write were offered help with completing the questionnaire. To ensure that participants did not miss their turn while completing a questionnaire, the research team monitored the queue. Participants who were interested in participating but were unable to complete the questionnaire at the hospital were given contact details of the research team in order to make arrangements for them to complete the questionnaire at a different time. Four participants expressed interest, and an appointment was set for them to complete the questionnaire at the clinic/hospital the next day. However, none of them returned. The questionnaire took about 50 minutes to complete.

### Measures

#### *Demographic and clinical characteristics*

Data were collected on demographic characteristics and clinical characteristics including personal information, information regarding HIV infection, medication adherence and HIV disclosure. Some of the data on information regarding HIV infection such as CD4 count and viral load were self-reported while some were collected from medical reports with participants' consent. Further, participants were

asked to rate their psychological and physical health on a scale from 0 (very bad) to 10 (very good).

#### *Needs assessment and assessment of intervention delivery mode*

A needs assessment questionnaire was developed to assess the needs of PLWH in Botswana. Participants were asked to indicate for a number of areas whether they would (maybe) like to receive help or not (feelings of anxiety, feelings of sadness, physical tension, finding new goals in life, finding people to give support, finding or keeping work, coping with HIV, worrying). Also, participants were asked to indicate the preferred mode of intervention, the desired programme format and the preferred way of accessing HIV-related information.

#### *Depressive symptoms*

Depressive symptoms were measured using the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). The 20-item scale was developed for adults and adolescents to help identify depressive symptoms. The scale is a self-report measure with responses based on the frequency of occurrence of symptoms during the past week. It uses a four-point Likert scale (ranging from 0 = rarely/none of the time to 3 = most/all the time) and can be completed in 5–10 minutes. The possible range of scores for the scale is 0–60. The total score was attained by adding the scores of all items on the scale. The scoring for positive items (4, 8, 12 and 16) was reversed. We used the official cut-off score of 16 or higher to indicate the presence of clinically significant depressive symptoms. The scale has been reported to be a valid measure of depressive symptomatology in various populations (Radloff, 1991; Simoni et al., 2011; Vilagut, Forero, Barbaglia & Alonso, 2016; Baron, Davies & Lund, 2017). In the present study, the CES-D had an  $\alpha$  reliability of 0.86 (Table 1).

#### *Cognitive coping strategies*

The 36-item Cognitive Emotion Regulation Questionnaire (CERQ) was used to measure cognitive coping strategies used by PLWH. The questionnaire has nine subscales, each including four items (self-blame, other-blame, rumination, catastrophising, putting into perspective, positive refocusing, positive reappraisal, acceptance, and refocus on planning) (Garnefski, Kraaij, & Spinhoven, 2001, 2002). The items were measured on a five-point Likert scale, ranging from 1 (almost never) to 5 (almost always). The subscales were scored by adding the scores on the four items of each subscale. Each subscale had a minimum score of 4 and a maximum of 20. All subscales of the CERQ have been found to have good internal reliability with alpha ranging from 0.75 to 0.87 (Garnefski & Kraaij, 2007). The CERQ subscales have been found to have good internal reliability when used in different populations (e.g. Jermann, van der Linden, d'Acremont & Zermatten, 2006; Abdi, Taban & Ghaemian, 2012). In the current study, the alphas ranged from 0.70 to 0.79 (Table 1).

#### *Behavioural coping*

Behavioural coping strategies in this study were measured using the Behavioral Emotion Regulation Questionnaire

**Table 1:** Means, standard deviation, ranges and reliabilities of study variables

	Mean (SD)	Observed range	Cronbach's alpha	<i>n</i>
Depressive symptoms	15.37 (10.50)	0–53	0.86	242
Self-blame	10.04 (4.48)	4–20	0.74	233
Acceptance	15.22 (4.90)	4–20	0.77	233
Rumination	10.24 (4.76)	4–20	0.70	233
Positive refocusing	13.46 (5.31)	4–20	0.79	232
Refocus on planning	14.53 (5.08)	4–20	0.78	233
Positive reappraisal	14.50 (4.67)	4–20	0.72	232
Putting into perspective	11.78 (4.95)	4–20	0.71	233
Catastrophising	8.39 (4.76)	4–20	0.79	233
Blaming others	7.80 (4.40)	4–20	0.78	233
Seeking distraction	12.01 (5.04)	4–20	0.76	231
Withdrawal	7.35 (4.23)	4–20	0.73	231
Actively approaching	13.72 (5.30)	4–20	0.84	231
Seeking social support	13.55 (4.68)	4–20	0.82	231
Ignoring	11.46 (5.52)	4–20	0.80	231

(BERQ) (Kraaij & Garnefski, 2019). The questionnaire was used to measure behaviours that PLWH use in order to cope with having HIV and consists of five subscales (seeking distraction, actively approaching, seeking social support, withdrawal, and ignoring). Each subscale consisted of four items that were measured on a five-point Likert scale ranging from 1 (almost never) to 5 (almost always). The subscales were scored by adding the scores on the four items of each subscale. Each subscale had a minimum score of 4 and a maximum of 20. All subscales of the BERQ have been found to have good internal reliability with alpha ranging from 0.86 to 0.93 (Kraaij & Garnefski, 2019). In the present study, the alphas ranged between 0.71 and 0.84 (Table 1).

#### Data analyses and statistics

Statistical analysis was performed using the Statistical Package for Social Sciences software (SPSS) version 24 (IBM Corp, Armonk, NY, USA). First, box plots were made to identify outliers in the data and to examine the shape of the distributions. To describe sample characteristics regarding personal information and HIV-related information, descriptive statistics were used (mean scores, standard deviations, and range). The prevalence rate of clinically significant depressive symptoms was obtained by descriptive analyses (percentage). A cut-off score of 16 or higher on the CES-D (see measures) was used to classify a participant as having clinically significant depressive symptoms. In addition, mean depressive symptom scores and standard deviations were provided. Prevalence rates of self-reported mental health treatment needs and wishes were also obtained by descriptive analyses (percentages). To examine bivariate relationships between coping strategies and total depressive symptoms scores, Pearson correlations were calculated. To examine multivariate relationships between cognitive and behavioural coping strategies and total depressive symptom scores, three multiple regression analyses (MRAs) were performed. In the first MRA, depressive symptoms were regressed on the nine cognitive coping variables. In the second MRA, depressive symptoms were regressed on the five behavioural coping variables. In the third MRA, depressive symptoms were regressed on a combination of cognitive and behavioural strategies. In the latter analysis,

only the significant coping strategies from the first two MRAs were included, as the sample size was too small to include all strategies at the same time. To control for the influence of some demographic variables, age, gender and physical health as rated by the participant were entered in the first step (method enter).

#### Results

##### Preliminary analyses

Each variable was screened for missing data, normality and outliers, and scales were tested for reliability. Missing values were screened using the option 'frequencies' in SPSS, and a small number of missing values were identified. To deal with the problem of the missing values, individual mean scores for the scales/subscales were calculated based on the available data and used to replace the missing values (Field, 2009). This was only done when not more than a quarter of the items in a (sub)scale were missing for each score. Outliers were identified through box plots and stem and leaf diagrams generated in SPSS. After careful inspection, 15 cases were deleted from the dataset as it was noted that responses from these 15 cases seemed unreliable, where the same score was given to all items in the questionnaire including reversed items. The data were screened for normality using measures of skewness and histograms. Overall skewness was insignificant in terms of compromising subsequent analysis. The inspection of histograms also did not indicate the need for any adjustment.

##### Sample description

A total of 306 PLWH completed the questionnaire for the present study. After removing 15 cases due to the unreliable nature of the responses, data from 291 respondents were analysed. Females made up 73.0% of the sample. The mean age of the respondents was 39.7 years (SD 9.4; range 19–74 years). Almost all (98.0%) of the participants were Batswana. The majority (53.7%) reported never having been married, 24.0% were married, 15.3% were cohabiting, 2.8% were divorced and 3.5% were widowed. The proportion of participants who indicated that they had children was 86.1%. In total, 46% of the participants indicated that their partners were also living with HIV. More than half (60.2%) thought

they were infected with HIV through having unprotected sexual intercourse. The majority (92.0%) of the respondents were on HAART. A high proportion (92.1%) reported being satisfied with HIV treatment. Participants were prescribed between one and eight pills per day and 72.6% indicated that they took their medication 100% of the time. A history of tuberculosis was reported by 15.6% of the respondents. Other infections experienced due to HIV included herpes (4.4%), pneumonia (2.9%), cancer (4.8%), meningitis (2.9%) and fungal infection (4.4%).

About half (52.8%) of the participants lived in a town, 31.1% in a village and 16.1% in a city. In terms of educational background, 21.7% of the participants had primary education, 42.3% junior school education, 17.5% senior school education, 15.4% had college or university education, and 3.1% had no schooling. About half (52.3%) of the participants had a full-time job, 10.3% a part-time job and 37.4% were unemployed.

A history of depression was reported by 18.5% of the participants. Of those with a history of depression, 9.2% indicated that they had received treatment for depression in the five years before the study. Further, 5.1% indicated that there were receiving psychological treatment at the time of data collection.

#### **Descriptives of the study variables**

Table 1 presents the means, standard deviations, ranges and alpha reliabilities of the study variables. Reliabilities for all variables were moderate to high.

#### **Prevalence of clinically significant depressive symptoms**

In total 43.4% of participants had a score of 16 or higher, which is indicative of clinically significant depressive symptoms. By gender, 45.0% of females and 38.7% of males scored 16 or higher. This was not a significant difference. The mean score obtained for total depressive symptom score was 15.36 (SD 10.50, range 0–53). There was no statistically significant difference in mean scores for total depressive symptom scores between males ( $M = 15.18$ ,  $SD = 10.10$ ) and females ( $M = 15.43$ ,  $SD = 10.66$ ).

#### **Needs assessment**

The participants in the study indicated the need for help with various mental health issues (Table 2). Respondents especially indicated a need for help with anxiety, depression, physical tension, finding new goals in life and coping with HIV. A proportion of 60.7% of the participants indicated a preference for a self-help programme. In terms of the preferred mode of interventions or programmes, 50.5% would prefer programmes that involve small groups of PLWH, 17.1% individual programmes and 32.4% a combination of both individual and group programmes. Overall, 75.0% of the participants would prefer for the intervention to be in the format of a booklet, while 25.0% would prefer an online version. About half (52.2%) of the participants indicated that they had internet access. Participants preferred accessing the internet through their cellular phones (37.7%), computer (14.3%) and tablet (2.7%).

**Table 2:** Needs of PLWH in Botswana and feasibility of an intervention

Needs of PLWH	Indicated need for help (%)	<i>n</i>
Feelings of anxiety	72.3	224
Feelings of sadness	70.2	225
Physical tension	64.5	220
Finding new goals in life	74.4	219
Finding people to give support	70.1	224
Finding or keeping work	70.9	220
Coping with HIV	71.2	222
Worrying	68.8	224
Preferred mode of intervention		216
Face-to-face counselling/therapy	38.0	
Self-help programme	60.7	
Other	1.3	
Desired programme format		216
Small groups of PLWH	50.5	
Individual programme	17.1	
Combination of individual and group programmes	32.4	
Preferred way of accessing HIV-related information		223
Booklet	75.0	
Internet	25.0	

#### **Relationships among study variables: Pearson correlations and MRAs**

Table 3 presents the Pearson correlations between all study variables. Findings indicate that the CERQ subscales catastrophising, refocus on planning, rumination, positive reappraisal, positive refocusing, self-blame, blaming others, and acceptance correlated significantly with depressive symptoms. The BERQ subscale withdrawal was the only one with a significant correlation with depressive symptoms.

Tables 4, 5 and 6 present the results of the three hierarchical multiple regression analyses (MRAs) with regard to depression and coping strategies, controlling for age, gender and self-rated physical health. Table 4 presents the results of the MRA with cognitive coping strategies as the independent variables and depressive symptoms as the dependent variable. After controlling for age, gender, self-rated physical health and the other cognitive coping strategies, the cognitive coping strategies rumination and catastrophising were significantly positively correlated to depressive symptoms whilst positive refocusing and refocus on planning had a significant negative relationship with depressive symptoms. All nine cognitive coping strategies and control variables together explained 34% of the variance.

Table 5 presents the results of the MRA with the behavioural coping strategies as the independent variables and depressive symptoms as the dependent variable. After controlling for age, gender, self-rated health and the other behavioural coping strategies, the behavioural coping strategy withdrawal was still significantly related to depressive symptoms. All behavioural coping strategies and control variables together explained 14% of the variance.

In Table 6, all the variables that had a significant relationship with depressive symptoms from the first and



## Discussion

In the present study, we found that 43.4% of the participants reported depressive symptoms that were clinically significant. This is even higher than the prior study in Botswana (Lawler et al., 2011), where prevalence rates of 24% and 38% for depression were found. Possibly this has to do with the fact that in the current study more people lived in a village or town than in the study by Lawler and colleagues. It could be that living with HIV and related stigma is even more difficult in a town or village compared with a city, leading to higher depression rates. Compared to findings from (other) sub-Saharan countries, where the pooled prevalence estimates ranged from 9% to 32% (Bernard et al., 2017), the prevalence of depressive symptoms among PLWH in Botswana is also quite high. Contrary to our hypothesis, no gender differences were found in the present study. Therefore, the findings of the present study seem to confirm the severity of the problem of depressive symptoms for both men and women living with HIV in Botswana. Depressive symptoms among men and women living with HIV in Botswana seem to be a problem that should be addressed.

We also conducted a needs assessment for PLWH in Botswana. This has never been done before in Botswana or in other countries in sub-Saharan Africa. The findings showed that many PLWH in Botswana expressed the need for help with feelings of depression, coping with HIV and finding new goals. Furthermore, a self-help booklet intervention with some personal contact was preferred by PLWH in Botswana over other intervention options. Considering the lack of resources and qualified personnel in Botswana (Lewis et al., 2012), a self-help intervention programme seems more feasible than a face-to-face intervention programme. The effectiveness of group-based intervention programmes in sub-Saharan Africa has been studied and proven before (Kaaya et al., 2013; Petersen et al., 2014; Nakimuli-Mpungu et al., 2015). However, no self-help interventions have been studied before in Botswana or other countries in sub-Saharan Africa. Some evidence for the effectiveness and feasibility of a self-help booklet intervention programme for PLWH with depressive symptoms has already been found in the Netherlands (Kraaij et al., 2010). As such a programme would also match the self-expressed needs of PLWH in Botswana, it could be interesting to study the effectiveness of such a programme in Botswana.

In addition, we studied the relationships between coping strategies and depressive symptoms in order to find suggestions for specific targets for intervention programmes in Botswana. The multivariate analyses showed that several cognitive coping strategies had significant relationships with depressive symptoms, namely rumination, catastrophising, positive refocusing and refocus on planning (the latter two negatively). This confirmed our hypotheses and is in line with previous studies in Western countries (e.g. Kraaij et al., 2008; Kotzé et al., 2013). This suggests that future intervention programmes for PLWH in Botswana could target the same

cognitive coping strategies as employed in Western countries. With regard to behavioural coping strategies, the results were not as expected. In contrast to earlier studies (Kraaij et al., 2008; Kotzé et al., 2013), actively approaching was not found to be significantly related to depressive symptoms. Perhaps actively coping with having HIV might not be helpful in Botswana, due to the high stigma in that country. Coping in an active way might not have the same positive effect as it has in progressive countries like the Netherlands. Future studies should study this into more detail. The findings of the present study suggest that cognitive coping strategies may be more related to depressive symptoms than behavioural coping strategies among PLWH in Botswana. Cognitive coping strategies, therefore, seem to be important targets for intervention programmes for depressive symptoms for PLWH in Botswana.

It is important to know whether we can generalise our findings. First, the sample comprised more females than males. In Botswana, it is estimated that more women are affected by HIV when compared with men. According to the AVERT International HIV & Aids Charity report of 2017, more than half of PLWH in Botswana are women. Therefore, the gender disparity in this study could reflect a true division of males and females in terms of HIV infection. Furthermore, the sample included participants from across the country, making it more likely to represent people from various backgrounds. In conclusion, the sample might be representative of PLWH in Botswana.

A limitation of the present study was the cross-sectional design used; we cannot make conclusions regarding the direction of the relationships between coping and depression. Future research should use a longitudinal design in order to determine causality. Furthermore, we used self-report measures for all variables and this may have resulted in social desirability bias, especially given the sensitivity of the topic of HIV. Future studies should also include clinical interviews and observations.

To summarize, as the prevalence of clinically significant depressive symptoms among PLWH in Botswana seems to be high, it is important to offer psychological help. Based on the findings of the present study, intervention programmes for PLWH in Botswana could focus on coping strategies. People could be taught to use more adaptive strategies (such as positive reappraisal and refocus on planning) and to avoid using maladaptive coping strategies (such as rumination, catastrophising and withdrawal). Furthermore, based on the current study we suggest that a self-help programme in booklet format with personal contact would suit the needs of PLWH in Botswana. Future research could study the effectiveness of such an intervention programme.

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## Chapter 4

# A booklet self-help intervention to reduce depressive symptoms among people living with HIV in Botswana: study protocol for a randomized controlled trial



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STUDY PROTOCOL

Open Access

# A booklet self-help intervention to reduce depressive symptoms among people living with HIV in Botswana: study protocol for a randomized controlled trial



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## Abstract

**Background:** The treatment of mental health issues among people living with HIV (PLH) in Botswana is yet to be addressed. A recent study revealed that depressive symptoms are highly prevalent in a sample of PLH in Botswana. Based on empirical findings of a study that investigated intervention targets for PLH in Botswana, a self-help program with coaching in booklet format in the Setswana and English languages was developed, composed of cognitive behavioral techniques, coping skills interventions, and goal adjustment training. We will investigate the program for effectiveness in the treatment of depressive symptoms among PLH. Additionally, we will investigate treatment moderators and mediators. This paper describes the study protocol.

**Methods/design:** A randomized controlled trial will be conducted to compare the booklet self-help program with coaching with an attention-only control condition, by including pre-test, post-test, and follow-up assessments. We aim to enroll 200 participants with mild to moderate depressive symptoms into the study. The self-help program contains the following main components: activation, relaxation, changing maladaptive cognitions, and the attainment of new personal goals. This content is covered over six lessons to be completed in a maximum of 8 weeks. It uses a combination of psycho-education, assignments, and exercises. The participants will work on the program 1–2 h every week for 6 weeks (maximum 8 weeks). Coaches will offer support and motivate the participants. For both groups, depressive symptoms and possible mediators will be measured three times during the intervention, and at pre-test, post-test, and follow-up.

**Discussion:** If the intervention is found to effectively treat depressive symptoms, it will be implemented and thus help improve the psychological health of PLH in Botswana.

**Trial registration:** Netherlands Trial Register, [NTR7428](https://www.trialsregister.nl/ctd/show/NTR7428). Registered on 23 August 2018.

**Keywords:** HIV, Depression, Self-help, Cognitive behavioral therapy, Coaching, Randomized controlled trial, Africa, Botswana

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## Background and objectives

In sub-Saharan Africa, the rate of new HIV infections as well as mortality due to HIV has reportedly gone down in recent years [1]. The decrease in HIV mortality and new infections can be credited to an increased access to antiretroviral therapy (ART) as well as the introduction of other HIV prevention programs such as prevention of mother-to-child transmission (PMTCT) and increased access to condoms [1]. Consequently, HIV is now considered a chronic illness [2–4], and this shift has led to increased attention to the overall management of HIV. There have been great investments in policies and medical programs that ensure easy access to ART by people living with HIV (PLH) [5]. This has been the case particularly in Botswana. The UNAIDS 2017 report [1] shows an overall increase in ART access by PLH in Botswana and sub-Saharan Africa.

While medical care has received a lot of attention, addressing the mental health care of PLH has lagged behind, despite the reported high prevalence of mental health problems among PLH. Numerous literature sources have documented that mental health issues not only put a heavy burden on PLH but are also considered as important and common barriers to treatment adherence [6, 7]. One mental health factor that has been cited as especially important in this regard is depression [8]. In sub-Saharan Africa, depression has been shown to be the leading mental illness among PLH [7, 9, 10]. Based on self-report measures for depressive symptoms, the reported prevalence rates for depressive symptoms among PLH in sub-Saharan Africa vary quite widely, between 8 and 64% [9–12]. In Botswana, one study has reported a prevalence of depressive symptoms in women living with HIV of 48% [13]. Another, more recent study has found a prevalence rate of depressive symptoms among 291 PLH in Botswana of about 43% (Vavani et al., “Depressive symptoms among people living with HIV/AIDS in Botswana: a search for intervention targets for a coping-skills intervention,” submitted). Given the potential threat of depression to the health and well-being of PLH and to treatment adherence, it is critical to treat depressive symptoms among PLH. Unfortunately, no treatment programs specifically designed for PLH in Botswana exist. This is in part due to a mismatch between the demand for psychological services and the resources available [14]. Mental health services are provided by a limited number of psychologists and about 10 psychiatrists who serve the entire population of Botswana [15]. For a population of about 2 million, it can be assumed that the mental health services available do not reach everyone who needs them.

Until now, there is little evidence of effective intervention programs for depressive symptoms in PLH in sub-Saharan Africa. In Western countries, some intervention

programs have effectively treated depressive symptoms in PLH [16–23]. Depressive symptoms were assessed through different self-report measures. The content of the programs, mostly employing techniques from the cognitive behavioral approach, include stress reduction techniques and the facilitation of adaptive coping skills (including changing of maladaptive cognitions and behaviors) [16, 24]. Some interventions occur face to face, individually, or in small groups; others are in self-help, online, or booklet format.

One such program with good results is the recently developed cognitive behavioral self-help program “Living positive with HIV”. This self-help program was developed based on findings from research on the predictors of psychological well-being in PLH. The self-help program is aimed at reducing depressive symptoms among PLH [19, 25]. It is available both online and in booklet format and is low cost. It consists of weekly lessons and can be provided with or without (minimal) coaching. Participants are expected to work on the program on a weekly basis. The Living positive with HIV program in booklet format was found to be significantly effective in reducing depressive symptoms among Dutch PLH, both in the short term and in the long term [19]. A recent randomized controlled trial (RCT) found the online version to also effectively reduce depressive symptoms among PLH [23]. The inclusion criteria for the Living positive with HIV program were being HIV positive, presenting with mild to moderate depressive symptoms, being aged 18 years and older, having adequate knowledge of the Dutch or English language, having Internet access and an email address, and being available for 8 weeks in order to complete the intervention [23].

It was argued that a similar self-help program might effectively reduce depressive symptoms in PLH in other countries, in this case Botswana, at low cost. To ensure that such a treatment program would be evidence based and would address the unique needs and circumstances of PLH in Botswana (and other sub-Saharan countries), an empirical study was performed that investigated the prevalence and risk factors of depressive symptoms, the needs of PLH, and the feasibility of an intervention program in a sample of 291 PLH in Botswana (the aforementioned study of Vavani et al.). Participants indicated a need for help with various mental health issues such as feelings of depression, feelings of anxiety, physical tension, coping with HIV, and finding new goals in life. Several coping strategies were found to be significantly related to depressive symptoms, such as rumination, positive refocusing, refocus on planning, catastrophizing, and withdrawal. Participants indicated a preference for a program in booklet format over an online program.

Based on the empirical findings and indicated needs, a self-help program with coaching in booklet format for

PLH with depressive symptoms in Botswana was developed, composed of cognitive behavioral techniques, coping skills interventions, and goal adjustment training. For our purposes, goal adjustment training refers to helping patients to find realistic goals that they want to achieve and developing a concrete action plan to attain these goals.

This program will be investigated for effectiveness in the treatment of depressive symptoms among PLH. This paper describes the study protocol. By conducting an RCT, the booklet self-help program with coaching will be compared with an attention-only control condition. In addition, we will investigate treatment moderators, to study whether the program is more beneficial to some patients than to others. We will also investigate mediators of treatment, to study which mechanisms are related to treatment outcome.

## Methods/design

### Design

To evaluate the effectiveness of an intervention recently developed for PLH in Botswana, an RCT will be performed. The trial will have two conditions: an intervention group, who will receive the self-help program with coaching for depressive symptoms, and an attention-only control group, who will receive the self-help program without coaching following completion of the follow-up measurement. Random allocation of participants to the intervention or control group will be performed using a stratified random sampling technique. The sample will be stratified according to gender and treatment center. It is important to stratify by gender to ensure approximately equal proportions of males and females in the intervention and control groups. In the study by Vavani et al. that investigated intervention targets for depressive symptoms among PLH in Botswana, more females participated compared to males. Additionally, treatment centers are expected to differ with regard to the number of patients included; therefore, stratification will ensure that both the intervention and control groups in large and small treatment centers have almost the same numbers of patients in both conditions.

Random number tables will be used to allocate participants to either condition; these will be computer generated and produced by an independent researcher. Randomization will be done in permuted blocks of six. The independent researcher will enter the numbers into an Excel file which will conceal the randomization until after the participants are established in the trial. The randomization is set up such that the main researcher is unable to see treatment allocation beforehand, minimizing bias. Participants and coaches will not be blinded to allocation to conditions. Participant allocation to one of the conditions will be done after the pre-test.

The study is approved by the Health Research Development Committee of the Ministry of Health in Botswana (Ref. HPDME 13/18/1). The Standard Protocol Items: Recommendations for Interventional Trials (SPIRIT) checklist is provided as Additional file 1.

### Participants

We will recruit about 200 participants from six HIV treatment centers in Botswana. These treatment centers were selected strategically to include the two largest referral hospitals serving the northern and southern ends of Botswana. As referral hospitals, they service PLH from different parts of the country, thus giving the study an increased likelihood of recruiting participants from various backgrounds.

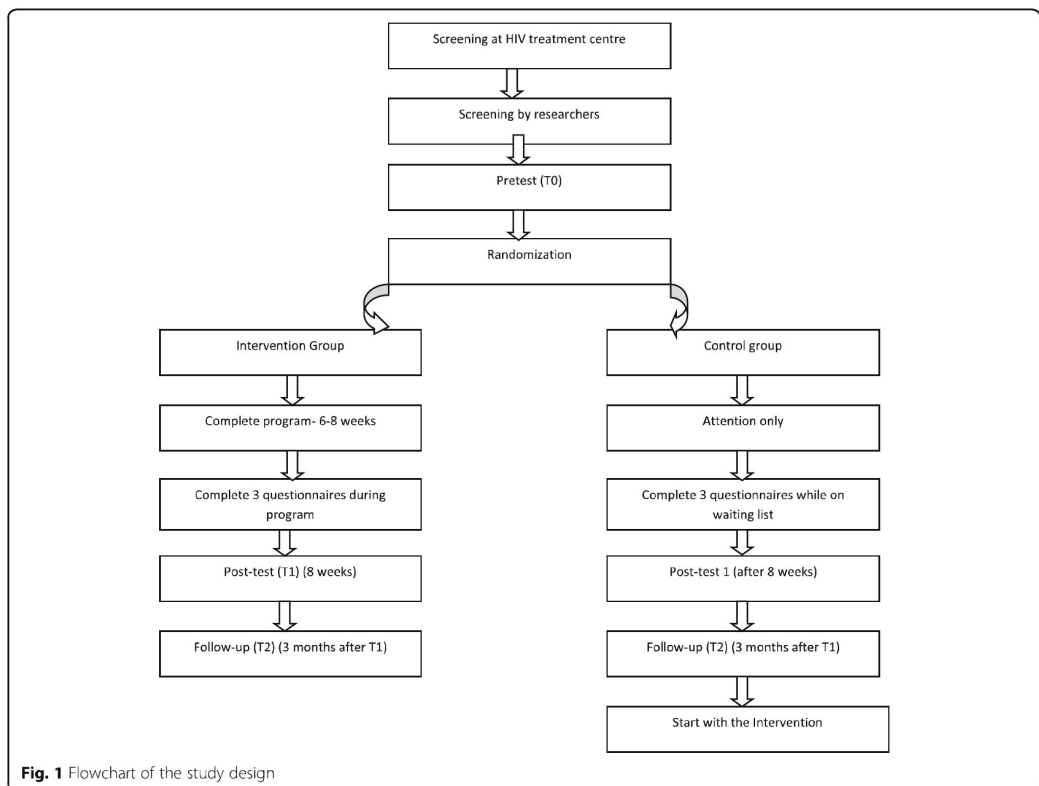
Recruitment of participants will be conducted using a short initial screening during their regular visits to the HIV medical staff. Further screening will be done by the researchers. The inclusion criteria for participation in the study are as follows: being HIV positive, presenting with mild to moderate depressive symptoms (that is, a score greater than 4 and less than 20 on the Patient Health Questionnaire 9 (PHQ-9) [26], aged 18 years and older, having sufficient knowledge of the Setswana or the English language, and available for the next 8 weeks to work on the intervention. The exclusion criteria are as follows: (almost) no symptoms of depression (a score of 4 or less on the PHQ-9), presenting with severe cognitive impairments (medical staff and coaches to use their clinical judgement to determine if the patient may be presenting with severe cognitive deficits), being in the first 6 months post-HIV diagnosis, and suicidality as determined by a score of >1 on the suicide item of the PHQ-9. Those who score within the severe depressive symptoms range ( $\geq 20$ ) or suicide ideation as measured by the PHQ-9 will be referred for face-to-face psychological or psychiatric treatment or to a medical doctor at the treatment center.

### Sample size

To determine the sample size needed for the RCT, we performed a power analysis using the 14th Edition of the Power Analysis and Sample Size Software (PASS) [27]. It was calculated that each group should consist of 64 participants (effect size = 0.50, alpha = 0.05, and power = 0.80). Similar studies have recorded a dropout rate of 15%; therefore, at least 75 participants should be allocated to each group. Taking into account the possibility of further dropout at follow-up, a total of 200 participants will be recruited for the RCT.

### Procedure

The study design flowchart is presented in Fig. 1. We will start by providing information about the study,



screening guidelines, and forms to the treatment centers. Participants will be screened for depressive symptoms by the HIV nursing consultants and doctors during their regular check-ups at the treatment centers using the PHQ-2 questionnaire. Participants will also be screened for meeting the inclusion criteria (age 18+, HIV diagnosis longer than half a year, access to a telephone, ability to read/understand English or Setswana well, no severe cognitive limitations, such as severe forgetfulness or mental confusion, and no current treatment by a psychologist or psychiatrist at this moment) with the use of a short checklist.

In Botswana, the majority of patients who have been on treatment for more than a year visit the treatment center once every 6 months; therefore, the screening will be conducted over a period of approximately 6 months. Any patient who obtains a score  $> 0$  on the PHQ-2 and who meets the inclusion criteria may be referred to the researchers. The HIV consultants will provide written information about the study to the patients and request for permission to provide the researchers with the patient's contact

information (telephone number or email). Following contact with the patients, the researchers will provide further information to the patients and conduct extensive screening for depressive symptoms using the PHQ-9 by telephone. Patients with a score within the mild ( $> 4$ ) and moderate ( $< 20$ ) ranges will be eligible for participation in the trial. These patients will then be invited to participate. Those who agree to participate will give consent by a text message to the researchers. Additionally, we will seek permission from patients to inform a medical doctor or general practitioner at the HIV treatment center about their participation in the study. Participants will then undergo a pre-test (T0). Thereafter, the participants will be randomly assigned to the intervention or the control (attention-only) group. The coaches will call all participants at the beginning of the intervention to assess for and stimulate their motivation. This will be accomplished through the use of motivational interviewing and general conversational techniques, providing information about the program, helping the patients plan for the lessons,

and advising them to engage in a small activity to get started.

The intervention group will then receive the self-help treatment program with coaching by telephone, while the control group will only receive attention through a weekly telephone chat from a coach. The participants will work on the intervention for 6 weeks (with a maximum extension of 2 weeks). During the intervention, participants will be asked to answer standardized questions at three different times. At 8 weeks, all participants will complete the post-test (T1) and subsequently the follow-up measurement (T2) 3 months later. After the follow-up, participants in the control condition will receive the intervention.

The pre-test, post-test, and follow-up assessments will be done by the researchers through a standardized telephone interview; the three assessments during the intervention will be done during the coaching sessions, after the completion of lessons 1 (activation), 2 (physical relaxation), and 4 (changing negative thinking patterns). Callers will follow a standard script where they will explain who they are and the purpose of the interview. Participants will be asked questions exactly as they appear on the questionnaire. The answer categories for each section will be called out, and the participants will be asked to write them down for easy reference. Callers are allowed to repeat questions at the request of the participant.

#### **Study conditions: booklet self-help intervention**

The booklet self-help with coaching intervention employs cognitive behavioral therapy (CBT) and stress management techniques and is based on self-regulation and stress-coping theories [28]. The content of the self-help program contains the following main components: activation, relaxation, changing maladaptive cognitions, and the attainment of new personal goals. This content is covered over six lessons to be completed in a maximum of 8 weeks and uses a combination of psycho-education, assignments, and exercises. To reduce attrition over time and to keep participants motivated, coaches will offer support and motivate participants.

The participants receive the intervention in the form of a booklet and will work on the program 1–2 h every week for 6 weeks. The first lesson is an introduction to the program and focuses on activation. Participants will be asked and encouraged to think of a small concrete new activity to perform. Throughout the program, participants will be encouraged to continue thinking about small concrete new activities to perform. Lesson 2 will be cover physical relaxation. Participants are taught to do some relaxation exercises that they continue with for the rest of the program. The third lesson will focus on changing negative thoughts. Participants are trained to

recognize and change their negative thinking patterns. In lesson 4, participants will learn strategies to stop unpleasant thoughts whenever they want (for instance, by using a positive feeling). In lesson 5, participants will be helped to find new, meaningful, concrete, and time-bound life goals. They will be guided to work on attaining their goals. The last lesson will focus on achieving self-confidence to achieve their goals. Participants will learn to challenge negative thoughts which prevent them from working on their goals and gain confidence to achieve their goals. The program concludes with a summary of the important tips and tricks.

#### **Support from a coach**

A coach will be allocated to each participant to provide support and motivation for the duration of the program. At the beginning of the program, the coaches will make telephone contact with the participants to introduce and explain technical aspects of the program and provide motivation. The coach will also schedule a weekly telephone call with the participant that will last approximately 15 min. During the telephone call, the coach will enquire about the progress of the participant and problems encountered and will offer support and motivation as well as encourage the participant to continue working on the program. Coaches follow a script to interview patients. Furthermore, coaches will be asked to record their telephone calls and also note what they discussed with the patient after every call. The audio recording and notes will be used to check if the coach follows protocol during supervision with the researchers and/psychologist. No formal psychotherapy will be provided to the participants by the coaches. During the telephone calls, the coach will provide support and motivation by enquiring about the participant's progress, making motivational statements, and listening and providing guidance in case the participant is facing any problems. Six telephone coaching sessions will be provided in total, connected to each of the six lessons. The participant is expected to complete the program in 6 weeks, with a maximum extension to 8 weeks. If a participant has not completed the program after 8 weeks, he/she is allowed to continue with the program; however, the coaching will stop.

In the control condition, all participants will only receive minimal support in the format of six telephone calls by a coach over a period of 6–8 weeks. The weekly telephone calls between coaches and participants in the control condition will last for approximately 5 min. During this telephone call, the coaches will enquire about the participant's well-being. Coaches will monitor the depressive symptoms of the participants and try to prevent participant dropout by helping them to explore solutions to the obstacles they face with the program,

discussing the pros and cons of quitting, and continuing to make motivational remarks.

The coaches will follow guidelines on the protocol regarding provision of support and motivation. All coaches will be trained in the study procedures, and they will be expected to record each telephone call conversation and the elements used during the call such as motivation and support. Coaches will be students with a minimum of a Bachelor of Psychology degree and will have completed a clinical course during their training and been taught communication skills, interview techniques, and treatment strategies. Personal interviews will be held before coaches are appointed, and only those coaches with adequate communication skills and the capacity to provide support and motivation will be selected. Selected coaches will be provided with extra training, such as motivational interviewing skills. The researchers and a licensed psychologist will supervise the coaches. In the first month of the study, the main researcher and the coaches will hold meetings every week to discuss any challenges they are facing. Thereafter, meetings will be held every 2 weeks. Should problems arise during meetings between the coaches and the main researcher, the responsible psychologist will be contacted.

#### Ethical precautions

Coaches will monitor the depressive symptoms of all participants on a weekly basis by asking how the participants are doing. When participants express severe depressive symptoms, the PHQ-9 will be administered. In case of any participant in either condition showing severe depressive symptoms (PHQ-9 > 20) or suicide ideation, the coaches will follow referral guidelines. The coaches will discuss the situation with the participant before any steps are taken. The coaches will also discuss all steps with the psychologist. The participant can be referred to a medical doctor, his/her general practitioner, or the HIV treatment center. A participant who is referred for intensive treatment to a psychologist or psychiatrist may continue with the study. However, in the analysis, the referral will be entered as a covariate to account for the influence of the treatment. These guidelines are contained in the study protocol for coaches.

#### Assessments

The data will be collected at six different times during the trial (T0, three in-between assessments during the intervention, T1, and T2). Table 1 shows each stage of the study and the assessments that will be used. The initial screening (PHQ-2) will be done at the treatment centers by HIV nursing staff and doctors. At T0, T1, and T2, the researchers will conduct the assessments via a standardized telephone interview. The three in-between

assessments will be conducted by the coaches by telephone.

To measure depressive symptom severity (primary outcome), we will use the PHQ-9 [26] and the Center for Epidemiological Studies Depression Scale (CES-D) [29]. Secondary outcomes include physical tension (physical tension questionnaire), activation (Behavioral Activation for Depression Scale (BADs) [30]), cognitive coping (Cognitive Emotion Regulation Questionnaire-short (CERQ-short) [31]), behavioral coping (Behavioral Emotion Regulation Questionnaire (BERQ) [32]), symptoms of anxiety (Generalized Anxiety Disorder 7 (GAD-7) [33]), negative life events (Life Events Scale [34]), self-efficacy (Garnefski and Kraaij, "Self-efficacy questionnaire," unpublished), goal reengagement [35], social support, alcohol and substance abuse [36], and demographic variables. Some of the measures are single-item questions that are based on the original scales. The items were selected based on item-total correlations from our earlier research that investigated prevalence and risk factors of depressive symptoms of PLH in Botswana (Vavani et al., "Depressive symptoms among people living with HIV/AIDS in Botswana: a search for intervention targets for a coping-skills intervention," submitted). We will also measure the participants' motivation to start the intervention, compliance, dropout and reasons for the dropout, and user satisfaction.

Through a self-designed questionnaire, we will collect information on demographic characteristics (such as age, gender, and level of education) and clinical and psychological characteristics (such as age, depressive symptoms severity, physical health, HIV status, alcohol and substance use, motivation, and social support) as potential moderators of treatment. We will measure treatment mediators and depressive symptoms (dependent variable) during the intervention as well as during the waiting period for the control condition. The following mediator variables will be assessed in the study: physical tension (one item), activation (one item), coping (four subscales from the CERQ-short: rumination, catastrophizing, positive refocusing, and refocusing on planning), self-efficacy (one item), and goal reengagement (six items). This makes it possible to examine which mechanisms precede change in the primary outcome.

On the basis of findings from our previously mentioned study that investigated the prevalence and risk factors of depressive symptoms, needs of PLH, and feasibility of an intervention program in a sample of 291 PLH in Botswana, we decided to use shortened questionnaires where possible, because respondents had great difficulty completing all the questionnaires. Where available, we used existing short versions, such as the CERQ-short, PHQ-2, and PHQ-4. Regarding the rest of the

shortened questionnaires, the best items were selected based on item-total correlations in the data from the baseline study to ensure that they best fit our sample.

#### **Patient Health Questionnaire 9 (PHQ-9)**

The PHQ-9 will be used to measure the severity of the participants' depressive symptoms during pre-test and post-tests [26]. It will be used for screening and for measuring change in depressive symptoms over the period of the intervention/waiting period. The questionnaire has nine items measured on a 4-point scale ranging from 0 (not at all) to 3 (nearly every day). The total score ranges from 0 to 27 with a score of  $\leq 4$  indicating minimal or no depressive symptoms, 5–9 mild depressive symptoms, 10–14 moderate depressive symptoms, 15–19 moderately severe depressive symptoms, and 20–27 severe depressive symptoms. A total score is obtained by adding the scores of the nine items. The scale has been widely used in measuring depressive symptoms and

has good psychometric properties [26]. In addition, the PHQ-9 is often used with PLH and has been found to be highly reliable [37].

#### **Patient Health Questionnaire 2 (PHQ-2)**

The PHQ-2 [38] will be used to screen participants at the hospitals for depressed mood. The scale consists of the first two items of the PHQ-9 measured on a 4-point scale ranging from 0 (not at all) to 3 (nearly every day). The sum score ranges from 0 to 6 with higher scores indicating significant depressive symptoms. A total score is obtained by adding the scores of the two items. For the proposed study, any participant who scores above zero will be referred, after consent, to the study for further screening. The scale has shown good psychometric properties [38].

#### **Patient Health Questionnaire 4 (PHQ-4)**

The PHQ-4 [39] will be used to measure symptoms of depression and anxiety during the intervention or

**Table 1** Summary of assessments for the study

Assessment	Screening HIV treatment centers (+/- 5 min)	Screening researchers (+/- 10 min)	T0: pre-test (+/- 25 min)	Three times during intervention/waiting period <sup>1</sup> (+/- 10 min)	T1: post-intervention/waiting period: 6–8 weeks after T0 <sup>1</sup> (+/- 20 min)	T2: 3 months follow-up (+/- 20 min)
PHQ-2	X	–	–	–	–	–
PHQ-9	–	X	X	–	X	X
CES-D	–	–	X	–	X	X
Demographics and other information	–	–	X	–	X	X
Physical tension questionnaire	–	–	X	X	X	X
BADS	–	–	X	X	X	X
CERQ-short	–	–	X	X	X	X
Self-efficacy questionnaire	–	–	X	X	X	X
Goal Disengagement and Reengagement Scale	–	–	X	X	X	X
BERQ	–	–	X	–	X	X
GAD-7	–	–	X	–	X	X
PHQ-4	–	–	–	X	–	–
Life Events Scale	–	–	X	–	X	X
Motivation	–	–	X	–	–	–
Social support	–	–	X	–	X	X
Alcohol and substances	–	–	X	–	X	X
Compliance	–	–	–	X	X	–
Dropout	–	–	–	X	X	–
User satisfaction questionnaire	–	–	–	–	X	–

PHQ-2 Patient Health Questionnaire 2, PHQ-9 Patient Health Questionnaire 9, CES-D Center for Epidemiological Studies Depression Scale; BADS = Behavioral Activation for Depression Scale, CERQ Cognitive Emotion Regulation Questionnaire, BERQ Behavioral Emotion Regulation Questionnaire, GAD-7 Generalized Anxiety Disorder 7, PHQ-4 Patient Health Questionnaire 4

<sup>1</sup>Not asked to participants in the control group

waiting period for the control group. The scale consists of the first two items of the PHQ-9 and the first two questions of the GAD-7 measured on a 4-point scale ranging from 0 (not at all), 1 (several days), 2 (more than half the days), to 3 (nearly every day). The sum score ranges from 0 to 12 with higher scores indicating significant depressive symptoms. A total score is obtained by adding the scores of the four items [39]. The PHQ-4 has been shown to be highly reliable in screening both depression and anxiety [39, 40].

#### **Physical tension questionnaire**

One item from the physical tension questionnaire (developed by Garnefski and Kraaij, unpublished) will be used to assess physical tension. The item "How often do you experience tight (or tense) feelings in your body?" was selected based on item-total correlations from our finding from a previous study that investigated the prevalence and risk factors of depressive symptoms, needs of PLH, and feasibility of an intervention program. The item is measured on a 5-point scale from 1 (always), 2 (often), 3 (sometimes), 4 (rarely), to 5 (never). A higher score indicates less physical tension.

#### **Behavioral Activation for Depression Scale (BAD5)**

The BAD5 is a scale consisting of 25 items that are measured on a 7-point scale ranging from 0 (not at all) to 6 (completely). The scale is used to measure weekly changes in depression-related behaviors. It measures changes in activation, avoidance/rumination, work/school impairment, and social impairment. The scale has been reported to have good psychometric properties [30]. We will use an item from the subscale of the BAD5 (activation) to measure how focused the participants are on achieving certain goals and completing planned activities in the past week. The item "I was an active person and accomplished the goals I set out to do" was selected based on item-total correlations from the baseline study data and is measured on a 7-point scale ranging from 0 (not at all) to 6 (completely). Participants who score highly have greater levels of activation.

#### **Cognitive Emotion Regulation Questionnaire-short version (CERQ-short)**

The CERQ-short is an 18-item questionnaire used to measure cognitive coping strategies [31]. Based on our previous study findings, four subscales of the CERQ-short (rumination, catastrophizing, positive refocusing, and refocus on planning) will be used to measure the cognitive coping strategies used by the participants in relation to living with HIV [31]. The items are measured on a 5-point Likert scale ranging from a score of 1 (almost never) to a score of 5 (almost always). Each subscale has a minimum score of 2 and a maximum of 10.

The subscales will be scored by adding the scores on the two items of each subscale. Higher scores on a subscale total indicate frequent use of the coping strategy. All of the subscales have been found to have good psychometric properties [31].

#### **Behavioral Emotion Regulation Questionnaire (BERQ)**

The BERQ is a 24-item scale that measures behaviors that PLH engage in to cope with having HIV [32]. Based on our previous study findings, behavioral coping strategies will be measured using two items from one subscale of the BERQ (withdrawal). Items were selected based on item-total correlations. Each item is measured on a 5-point Likert scale ranging from 1 (almost never) to 5 (almost always). The scores range between 0 and 10, and the total score is calculated by adding the scores of the two items of the subscale. Higher scores on the subscale total indicate frequent use of the coping strategy. All subscales of the BERQ have been found to have good internal reliability with alpha ranging from 0.86 to 0.93 [32]. In our baseline study, the alphas ranged between 0.71 and 0.84 (Table 1).

#### **Generalized Anxiety Disorder 7 (GAD-7)**

The GAD-7 questionnaire is used to measure the severity of generalized anxiety disorder [33]. We will use this scale to measure participants' severity of anxiety symptoms. The scale has seven items that use a 4-point scale ranging from 0 (not at all) to 3 (nearly every day). The total scale is obtained by adding the scores of all seven items. Scores range between 0 and 21. Participants with higher scores experience more symptoms of anxiety. The scale has adequate psychometric properties [33].

#### **Life Events Scale**

The 17-item Negative Life Events Scale [34] was shortened to eight items and will be used to assess the experience of negative life events in the participants' life in the past year (e.g., death of a significant other, divorce/breakup of a longstanding relationship, violence within family or partner relationship). The items were selected based on events known to correlate most strongly with depressive symptoms [41]. Furthermore, we included only life events that are relevant to our sample. The items will be measured on a 2-point scale (No or Yes), and a total score will be computed by adding all the response scores.

#### **Self-efficacy**

Self-efficacy will be assessed using one item from the 10-item HIV-specific self-efficacy questionnaire (Garnefski and Kraaij, "Self-efficacy questionnaire," unpublished), according to the original questionnaire [42]. The item "I am confident that I can deal with having HIV" was selected

based on item-total correlations. The item is measured on a 5-point Likert scale ranging from 1 (totally disagree) to 5 (totally agree). Higher scores indicate high self-efficacy (confidence in the ability to cope with having HIV).

#### **Goal Disengagement and Reengagement Scale**

Goal adjustment will be assessed using the six-item Reengagement subscale of the Goal Disengagement and Reengagement Scale [35]. The subscale was adapted to measure the participants' ability to reengage in new goals following disengagement from goals they can no longer achieve due to the HIV (e.g., "If I have to stop pursuing an important goal in my life because I have HIV, I seek other meaningful goals"). The items are measured using a 5-point Likert scale ranging from 1 (totally disagree) to 5 (totally agree). A high score represents more goal reengagement. We included an additional item "I have already found new goals." This item will not be used to calculate the total scores of the subscale.

#### **Alcohol and substance use**

A four-item questionnaire that measures the frequency of using alcohol, soft drugs, hard drugs, and sedatives in the past 3 months was developed based on the second item of the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) [36]. The ASSIST has been validated as a screening tool for alcohol and substance use cross-culturally [36]. The four-item questionnaire adapted for this study will be used to measure the frequency of alcohol and substance use (e.g., "In the past 3 months, how often have you used alcohol?") The items will be measured on a 5-point scale ranging from 1 (never), 2 (once/twice), 3 (monthly), 4 (weekly), to 5 (daily/almost daily). Higher scores indicate frequent use of alcohol or a substance.

#### **Social support**

Social support will be measured by a self-designed item that measures the level of satisfaction with support received. The item "Are you satisfied with the extent to which people around you try to support you in living with HIV?" will be measured on a 5-point scale ranging from 1 (not at all) to 5 (certainly). High scores indicate satisfaction with the social support provided.

#### **Demographic variables and other information**

A self-designed questionnaire will be used to collect demographic information that will be used to describe the study sample. The questionnaire will collect personal information at T0 (e.g., gender, age, level of educational), past episodes of depressive and anxiety symptoms, any psychological/psychiatric treatment received for the symptoms, and physical health. Information regarding the HIV infection will also be collected through the use

of a questionnaire at T0. We will ask the participants to indicate when they were diagnosed, cluster of differentiation 4 (CD4) cell count, viral load, whether they are taking ART, adherence to medication, and how satisfied they are with their HIV treatment. Questions regarding medication use for psychological problems and psychological treatment received since the beginning of the study will be asked at T0, and any changes in medication and treatment will be reported during follow-up.

#### **Motivation to start with the intervention**

Participants will be asked one question related to their motivation to start the intervention ("How motivated are you to start the intervention?"). Participants will rate their motivation to start the intervention on a scale from 1 (not motivated at all) to 10 (highly motivated).

#### **Compliance**

We will measure whether participants are adhering to the program. To assess for compliance with the program, we will ask the participants three questions to check whether they have read the information in the booklet about lessons and whether they followed the exercises in the booklet ("Which lesson(s) have you done since the last time you completed a questionnaire?", "Did you read the text and explanation in the lessons?", and "How often have you performed the following exercises since the last time you completed a survey?"). Participants can answer (Yes, completely), (Yes, partly), or (No, not at all) or tick lessons from the list provided for the last question. Compliance will be measured at three different points during the intervention and at post-test. Compliance will also be monitored through participant's calls with the coach.

#### **Dropout and reasons for dropout**

We will take record of all participants who are no longer following the intervention and those who have no interest in completing the questionnaires. Participants are expected to complete questionnaires at three different points during the intervention/waiting period and at post-test. Participants will be asked the reason(s) for dropping out of the study.

#### **User satisfaction questionnaire**

A self-designed questionnaire with 31 open and close-ended questions will be used to collect information regarding participants' satisfaction with the self-help program as well as their coach. The questionnaire will ask participants to evaluate the intervention as well as the support received from the coach assigned. Participants in the control condition will be asked 11 questions to evaluate their support from the coaches only. The

responses will help in adjusting the program where necessary.

### Statistical analyses

Data will be analyzed using an intention-to-treat (ITT) analysis [43]. We will use a two-tailed alpha of 0.5 for significance testing. To investigate baseline differences between conditions, we will use chi-square and analysis of variance (ANOVA) tests for categorical and continuous variables, respectively.

Differences between groups in depressive symptoms from pre-test to post-tests will be investigated using longitudinal multilevel regression analyses (LMRAs) [44]. We will adopt a two-level model where time and group will be included as fixed effects and the slopes for time and the intercept as random effects. The between-group analysis will include the pre-test, post-test, and follow-up. To investigate the long-term effects of the intervention, we will include the pre-test, post-test, and follow-up in the within-group analysis. To estimate the effects in the model, we will employ a maximum likelihood estimation type. We will also study the differences between participants who followed the intervention to the end and those who dropped out with chi-square tests and ANOVAs.

Furthermore, Cohen's *d* will be used to calculate within- and between-group effect sizes. Effect sizes less than 0.20 are regarded as having a small effect, 0.50 a medium effect, and 0.80 a large effect [45]. We will also explore clinically significant differences for individual change in depressive symptoms. Individual change scores of 5 or more for the PHQ-9, from pre-test to post-test and follow-up, will be regarded as clinically significant [46]. The same approach will be used to examine pre-treatment versus post-treatment changes with regard to all secondary outcomes.

We will examine moderators of the treatment outcome using LMRA. We will enter potential moderators individually. Additionally, we will employ the latent difference score model for mediation analysis [47].

### Discussion

The proposed study seeks to investigate the effectiveness of the booklet self-help program with coaching in the treatment of depressive symptoms among PLH in Botswana. In the proposed study, we will conduct an RCT and compare the booklet self-help program with coaching to an attention-only control group. We will also investigate treatment moderators and mediators. This section discusses first some strengths and thereafter some limitations of the proposed intervention program and study.

Firstly, to our knowledge, the proposed intervention program is the first treatment program designed to

reduce depressive symptoms among PLH in Botswana. Therefore, if the program is found to be effective, it will help reduce the burden of depression among PLH. The program is evidence based; it was developed based on the evidence from prior research and was developed expressly for the intended population of PLH (see the aforementioned study of Vavani et al.).

Secondly, this program is of a self-help format, thus giving participants the freedom to schedule time for their lessons and allowing them to work from any place they choose. In addition, it reduces current barriers that prevent many PLH from seeking help, such as a dearth of qualified mental health care professionals in Botswana for face-to face contact and fear of stigma [13]. This way PLH who suffer from depressive symptoms throughout the country can receive help.

Thirdly, regarding the methods used in the study, we will monitor our participants' level of depression and offer support through coaches. The support offered is likely to reduce the attrition rate. Fourth, the participants in the attention-only control group will receive the intervention after the 3 months follow-up. This means that participants will not have to wait longer than 3 months to receive treatment that they need. An additional strength of the study is that we will investigate moderators and mediators of treatment outcome, giving us valuable information regarding for whom and under what context the treatment works best. This input can eventually be used to optimize treatment and to personalize care. Lastly, we will include participants from treatment centers in different parts of the country, including the two main referral hospitals in the country. Therefore, participants from across the country have an opportunity to participate, which increases the generalizability of our study findings.

The present study also has limitations. Firstly, it is a booklet self-help program; thus, only those who can read and write can use the program. This could hamper the generalizability of our results. Secondly, we will exclude all participants whose depressive symptoms scores place them in the severely depressed range or those who indicate that they are suicidal. While these patients could still benefit from the self-help program, they require more intensive treatment. Additionally, we will conduct the follow-up 3 months following the post-test. While this period might be considered short, our argument is that it would not be ethical for participants in the control group to wait as long as 8 months before they can start the intervention. We will therefore enroll the control group to start the intervention after the 3 months follow-up.

Another limitation of the study is that, in resource-limited settings, the aspect of coaching required by this

program might become an obstacle in implementing the program. Therefore, it would be necessary for future research to explore the effectiveness of the program without coaching. Furthermore, for ethical reasons, we could not include a condition without coaching to study whether coaching could influence the outcome. This is also a question that can be addressed by future research. Lastly, participants will be screened using a short screening tool (PHQ-9) for depressive symptoms, and some may argue that this tool alone is not sufficient to make a diagnosis of depression. However, the current study aims to only assess and treat depressive symptoms and not to make a diagnosis for a depressive disorder. In addition, the PHQ-9 is validated as a reliable measure for depressive symptoms severity [26, 38]. Furthermore, the presence of mild to moderate depressive symptoms is part of the inclusion criteria and not a diagnosis of a depressive disorder.

In conclusion, we aim to investigate the effectiveness of a booklet self-help with coaching intervention program for depressive symptoms among PLH. The program runs for 6 weeks (maximum 8 weeks) and includes six lessons. If the program is found to be effective, it may be implemented in Botswana. In addition, the program may be adapted and implemented in other sub-Saharan countries.

### Trial status

The booklet intervention program has been developed and translated. The materials for the RCT are ready and under translation. Recruitment of patients has not yet started.

### Additional file

**Additional file 1:** SPIRIT 2013 checklist: recommended items to address in a clinical trial protocol and related documents. (DOCX 45 kb)

### Abbreviations

ANOVA: Analysis of variance; ART: Antiretroviral therapy; ASSIST: Alcohol, Smoking and Substance Involvement Screening Test; BADS: Behavioral Activation for Depression Scale; BERQ: Behavioral Emotion Regulation Questionnaire; CBT: Cognitive behavioral therapy; CD4: Cluster of differentiation 4; CERQ: Cognitive Emotion Regulation Questionnaire; CES-D: Center for Epidemiological Studies Depression Scale; GAD-7: Generalized Anxiety Disorder 7; ITT: Intention-to-treat; LMRA: Longitudinal multilevel regression analysis; PASS: Power Analysis and Sample Size Software; PHQ-2: Patient Health Questionnaire 2; PHQ-4: Patient Health Questionnaire 4; PHQ-9: Patient Health Questionnaire 9; PLH: People living with HIV; PMTCT: Prevention of mother-to-child transmission

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### Authors' contributions

All the authors designed the study and composed the manuscript. All authors read and approved the final manuscript.

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This study is funded by the University of Botswana.

### Availability of data and materials

Not applicable.

### Ethics approval and consent to participate

The study is approved by the Health Research Development Committee of the Ministry of Health in Botswana (Ref. HPDME 13/18/1).

### Consent for publication

Not applicable.

### Competing interests

The authors declare that they have no competing interests.

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## Chapter 5

# A Booklet Self-Help Intervention for People Living with HIV and Depressive Symptoms in Botswana: A Randomized Controlled Trial



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# A Booklet Self-Help Intervention for People Living with HIV and Depressive Symptoms in Botswana: A Randomized Controlled Trial

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## Abstract

In low- and middle-income countries (LMICs), there is a scarcity of psychological treatment options for people living with HIV (PLWH) with depressive symptoms. Self-help programs for depressive symptoms, in particular, are cost-effective and scalable, and therefore a promising tool in the treatment of depressive symptoms for people in low-resourced countries. This paper presents the results of a study that examined the effectiveness of a guided self-help program in reducing depressive symptoms in PLWH in Botswana. A Randomized Controlled Trial (RCT) was conducted on a sample of PLWH who were screened at HIV treatment centers in Botswana. The RCT had two conditions: an intervention group that received the self-help program with coaching and an attention-only control group. In both groups, a pre-test, post-test, and 3-month follow-up measurement were administered. Patients in the intervention group followed a booklet Cognitive Behavioral Therapy (CBT)-based self-help program. Seventy-two participants were included in the study. The results indicated significantly larger decreases in depressive symptoms in the intervention group than in the attention-only control group, both in the short and longer term, with large effect sizes. In addition, there were significant reductions in anxiety symptoms in the intervention group compared to the control group. The user satisfaction was high. Implementing this low-cost and scalable self-help program in a LMIC such as Botswana is critical in bridging the existing mental health treatment gap. This clinical Trial was registered with the Netherlands Trial registry, number NTR5407 on August 23, 2018.

**Keywords** Depressive symptoms · Self-help · HIV · Randomized clinical trial · Low-and-middle income countries

## Introduction

More than three decades since the first case of the Human Immunodeficiency Virus (HIV) was detected in Botswana, the country has one of the highest HIV prevalence rates in the world at 20.8% [1]. Being an upper-middle-income

country, many people living with HIV (PLWH) in Botswana have access to free anti-retroviral therapy (ART), which has greatly improved the quality of life and reduced HIV-related mortality [2]. Nevertheless, like many chronic illnesses, HIV progression can be unpredictable, and PLWH may

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often be required to cope with persistent physical symptoms that may lead to periods of intense emotional distress [3].

Depression is considered one of the most prevalent psychiatric conditions among PLWH [e.g. 4–10]. According to a systematic review and meta-analysis on PLWH living in sub-Saharan Africa (SSA) [5], prevalence rates of depression in PLWH on ART range between 9 and 32% [7, 11]. A more recent systematic review and meta-analysis investigating the burden of depression in outpatient HIV-infected adults in Sub-Saharan Africa, estimated the prevalence of major depression among PLWH at 17% and depressive symptoms at 26% [12]. Based on a few studies conducted in Botswana, the percentages of PLWH who also presented with depressive symptoms are even higher, ranging between 24% and 48% [10, 13, 14].

Depressive symptoms are considered one of the most important and common mental health barriers to medication adherence in PLWH [6, 15, 16]. Additionally, depressive symptoms have been found to further compromise quality of life. For example, many PLWH who also present with depressive symptoms have been found to have poorer health [17], to make less progress with regards to CD4 count, to be at higher risk of committing suicide [18], to generally progress faster to AIDS, and hence show increased rates of mortality [19]. Depressive symptoms have also been shown to be linked to an increase in risk behaviors that may further contribute to the spread of HIV, such as unprotected sexual intercourse, multiple sexual partners, and substance abuse [3]. PLWH are also prone to anxiety disorders. A previous meta-analysis [20] found that 15.5% of HIV patients had anxiety disorders. In Botswana, most research on anxiety amongst PLWH has been conducted among adolescents. Studies show that anxiety is a highly prevalent mental health condition in adolescents and young adults living with HIV in Botswana [21, 22]. Like depression, untreated anxiety is associated with poor medication adherence [23, 24] and has been found to promote risky sexual behaviors, which in turn may lead to increased HIV spread [24]. Given these associations, addressing mental health issues such as depressive symptoms and anxiety among PLWH, in addition to medical care, is critical in HIV prevention and treatment [25–30].

Worldwide, several psychological interventions have been developed to treat depressive symptoms in PLWH and have been found to be effective [e.g. 16, 25–29]. Psychological interventions for depressive symptoms in PLWH were most effective when a CBT approach was used [28]. In addition, research has found larger treatment effects for studies when psychologists were involved as treatment providers [31]. More recently, it was found that psychological treatments could also be effective in treating depressive symptoms in PLWH in Low- and Middle-income Countries (LMICs) [4, 32], including African countries [33–37].

However, it was suggested that interventions should be short and easy to deliver, for example, provided by trained lay counselors [4].

Despite this evidence, there are still many barriers to mental health treatment in Africa for PLWH. These barriers include limited funds, lack of awareness and knowledge of mental disorders, lack of mental health services, a negative attitude towards mental health care [38–41], lack of appropriate screening materials, lack of trained personnel, and lack of psychological treatment programs [13, 14, 41]. In Botswana, for instance, mental health services are delivered through a tiered system with primary care at health posts, secondary care at district hospitals with psychiatric outpatient clinics and tertiary care at the only psychiatric hospital called Sbrana Psychiatric Hospital [42]. When developing psychological programs for PLWH in LMICs, it is important to consider the contextual information of these countries. For example, to overcome personnel barriers, the use of paraprofessionals might be needed in order to reduce the burden on the few psychologists that practice in these countries [4, 8]. To overcome financial and geographical barriers, it has been suggested that a low-cost self-help program would be a promising tool in the treatment of depressive symptoms among PLWH in LMIC [e.g. 16, 43]. Self-help programs are efficient in alleviating symptoms of depression [44] and have the advantage of being cost-effective [45]. Moreover, self-help interventions involve less staff time [46], can be computer-adapted [47, 48], and are suggested to be more suitable in settings short of professional and highly qualified healthcare workers [49].

The present study aimed to fill in the psychological treatment gap for PLWH in SSA, particularly in Botswana, by developing and evaluating a self-help treatment program for PLWH with depressive symptoms, with the potential to reach a high number of people, with low costs and few staff. To do this, an existing program [50] that was empirically based, was selected, as it was shown to be effective, and offered the possibility to adapt it to the needs of PLWH in SSA/Botswana.

This program is called ‘Living positive with HIV’. The program focuses on reducing depressive symptoms among PLWH and is based on principles of CBT. It was developed after a number of empirical studies, first focused on finding the right targets for intervention [51–53] and later on investigating the effectiveness of the program in a Randomized Controlled Trial [16]. There are two versions of the program: a booklet and an online version, with approximately the same content [31, 50]. The program focuses on activation, relaxation, changing maladaptive cognitions, and goal attainment. A randomized controlled trial (RCT)

showed that the online program was also effective in reducing depressive symptoms among PLWH in the Netherlands [31].

In the current study, we adapted and evaluated the ‘Living positive with HIV’ program in Botswana. To ensure that the adapted treatment program would address the specific needs of PLWH in Botswana, as an important first step, a pre-study was carried out among 291 PLWH in Botswana [10]. The aims of this pre-study were threefold. First, to confirm that the targets for intervention were the same for PLWH in Botswana as for people in the Netherlands; therefore, it was studied which psychological factors were associated with depressive symptoms. Second, to ask people about their self-reported needs. Third, assess PLWH’s preferences with regard to intervention format and guidance. Regarding the results on the psychological variables, some maladaptive coping strategies were identified, which were positively associated with depressive symptoms, such as rumination, catastrophizing and withdrawal. Also, some more adaptive strategies were identified, which were negatively associated with depressive symptoms, such as positive refocusing and focus on planning [10]. It was concluded that these topics matched the components of the original intervention. Regarding the self-reported needs, the participants expressed a need for help with various mental health problems such as feelings of depression, feelings of anxiety, physical tension, coping with HIV, and finding new goals in life. Regarding participants’ preferences about format and guidance, the findings indicated that a self-help program in booklet format was preferred over an online program and that the participants would like some form of coaching [10].

Based on this information, we tailored the ‘Living positive with HIV’ program to the needs and characteristics of PLWH in Botswana. We adapted a self-help program with coaching in booklet format for PLWH with depressive symptoms in Botswana. Like the original program, the program is based on principles of CBT and includes cognitive-behavioral techniques, stress management, and coping skills. Also, techniques for goal adjustment are included, to help participants to find realistic goals that they want to attain and to develop an action plan to actually attain the goals. The content of the program for Botswana differed from the original program only regarding some of the examples used in the lessons to make them more relevant to the Botswana sample.

In this article, we investigated the effectiveness of this adapted, guided self-help program for PLWH with depressive symptoms in Botswana. An RCT was conducted, in which the intervention group was compared with an attention-only control group which was on a waiting list for the intervention. The effect of the intervention was examined on the short and long term (three months follow-up). Based on

previous studies [16, 31], we hypothesized that people who followed the intervention would have a larger reduction in depressive symptoms than the control group. In addition, we investigated the effect of the intervention on anxiety. Also, user satisfaction with the intervention was determined.

## Methods

### Study Design

An RCT was performed. The trial had two conditions: an intervention group that received the self-help program with coaching and an attention-only control group. In both groups, a pre-test, a post-test and a follow-up measurement were administered. After the waiting period and completion of the follow-up measurement, the attention-only group received the self-help program without coaching. The flow chart of the study is presented in Fig. 1.

### Randomization

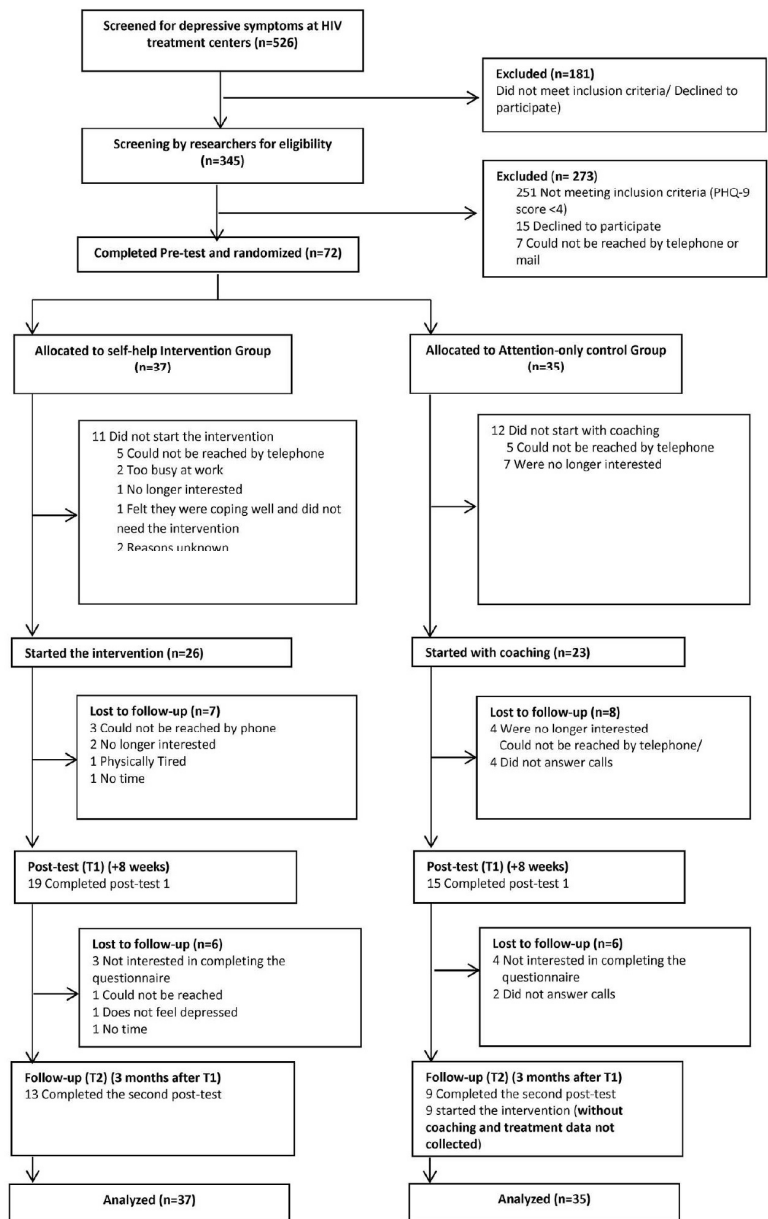
Random allocation of participants to the intervention or control group was performed using a stratified random sampling technique. The sample was stratified according to gender and treatment centers. It was important to stratify by gender to ensure approximately equal proportions of males and females in the intervention and control group. Additionally, treatment centers were expected to differ with regard to the number of patients included. Therefore, stratification was meant to ensure that both the intervention and control groups in large and small treatment centers had approximately the same number of patients in both conditions.

Random number tables were used to allocate participants to either group, and these were computer generated and produced by an independent researcher. Randomization was done in permuted blocks of six. The independent researcher entered the numbers into an Excel file which concealed the randomization until after the participants had been part of the trial. The randomization was set-up such that the words (intervention and control) on the Excel file were made white, hiding the condition to be allocated from the main researcher, to minimize bias. During the allocation - after the pre-test- the words were made visible by the main researcher. The coaches and participants were informed of the treatment allocation after the pre-test.

### Participants

The inclusion criteria for participation in the study were (i) being HIV positive and receiving medical treatment in an HIV treatment center, (ii) presenting with mild to moderate

Fig. 1 RCT flow chart



depressive symptoms (that is, a score higher than 4 and lower than 20 on the PHQ-9; see measurements), (iii) being aged 18 years and older, (iv) having sufficient knowledge of the Setswana or the English language, and being available for the next eight weeks to work on the intervention. Exclusion criteria were: (i) severe cognitive impairments (clinical

judgment by medical staff and researchers), (ii) being in the first six months post HIV-diagnosis, and (iii) suicidality (as determined by a score higher than 1 on the suicide item of the PHQ-9). Those who scored within the severe depressive symptoms range ( $\geq 20$ ) or showed suicide ideation as measured by the PHQ-9, were referred for face-to-face

psychological or psychiatric treatment or to a medical doctor at the treatment center.

## Procedure

Six HIV treatment centers, spread across the country, had agreed to help with the recruitment, by screening and selecting participants. In the current study, data presented was collected from one treatment center (Princess Marina Hospital) due to challenges in screening and referral that were encountered in other study sites. Despite this, the Princess Marina Hospital is the largest hospital in the country [54] and a referral hospital serving individuals from across the country.

We started by providing information about the study, screening guidelines, and screening forms to the treatment centers. We also advertised the study at all participating HIV treatment centers. A poster with information about the study was placed at all study sites. Additionally, the researchers were given an opportunity to introduce the study to potential participants during morning prayers at the treatment centers.

Initial screening of patients who consented was conducted by either nursing consultants or the researchers when the patients arrived for their regular visits to the HIV treatment center. The Patient Health Questionnaire-2 (PHQ-2) [55] was used for this. Patients had to score at least 1 to be eligible for further screening by the researchers. These patients were provided with written information about the study and permission was requested to provide the researchers with the patient's contact information (telephone number or email). Only patients who volunteered and consented to participate were assessed for eligibility. Subsequently, a second and more elaborative screening took place by the researchers by telephone. In this more elaborate screening, the Patient Health Questionnaire-9 (see measurements) was administered. Patients eligible for participation were invited to participate and were asked to give consent by text message to the researchers. Subsequently, a coach was allocated to each eligible participant to provide support and motivation for the duration of the program. Subsequently, participants completed the pre-test (T0) and were randomly assigned to the intervention or control (attention only) group.

The standard of care for all participants is such that the participants consult with a general practitioner once every three months to six months depending on the length of time since HIV diagnosis and on the response to medication. PLWH also visit the pharmacy for a refill of their HIV medication, either, monthly, quarterly or every six months, also depending on their response to treatment. Those who default on treatment or have a poor response are followed up and sometimes referred for counseling provided by HIV lay counselors.

## Measurement Moments

Recruitment was conducted between January 2019 and March 2020 and participants were enrolled in batches. The pre-test (T0), post-test (T1) and post-test 2 (T2) were administered by the researchers by a standardized telephone interview. Questions were read out aloud exactly as they appeared on the standardized questionnaire. The answer categories for each section were also read out aloud and the participants were asked to write them down for easy reference. Researchers could repeat questions at the request of the participant.

Participants completed the post-test (T1) 8 weeks after the start of the intervention and subsequently post-test 2 (T2) 3 months later. After the second post-test, participants in the control group received the intervention.

## Booklet Self-Help Intervention

The booklet self-help intervention employs Cognitive Behavioral Therapy (CBT) and stress management techniques and is based on self-regulation and stress-coping theories. Based on the CBT model, the focus of the intervention is on changing maladaptive thoughts, behaviors and adapting life goals. The content of the self-help program contains the following main components: activation, relaxation, changing maladaptive cognitions, and the attainment of new personal goals. This content was covered over six lessons that were to be completed in 6 to 8 weeks. The content included a combination of psychoeducation (e.g. a lesson on the vicious circle of negative thoughts, emotions, behaviors, and physical reactions), assignments (e.g. creating a plan for the continuation of the relaxation exercises), and some activities (e.g. finding and changing a negative thought). Participants were expected to work on the program 1–2 h every week. Participants were asked during the weekly calls about the last lesson that had been completed, whether they read the text and explanation in the lessons, and how often they performed the exercises since the last time they completed a questionnaire. These questions were asked to gauge if participants were able to adhere to the intervention timelines and requirements.

The first lesson was an introduction to the program and focused on activation. Participants were asked and encouraged to think of a small concrete new activity to perform. Throughout the program, participants were encouraged to continue thinking about small, concrete new activities to perform. Lesson 2 was on physical relaxation. Participants were taught to do some relaxation exercises that they continued with for the rest of the program. Participants could choose between a body check exercise that was provided in the booklet or follow a YouTube link for a voice recording

by either a male or female voice. The third lesson focused on identifying and challenging negative thinking patterns and replacing them with more helpful thoughts. In lesson 4, participants learned strategies to stop unpleasant thoughts by applying a counter-conditioning technique. In lesson 5, participants were helped to find new, meaningful, concrete, and time-bound life goals. They were guided to work on attaining their goals. The last lesson focused on getting self-confidence to achieve their goals. Participants learned to challenge negative thoughts that prevented them from pursuing their goals. An overview of the key lessons from the program was given at the end. The booklet was available in English and Setswana.

### Coaching

All coaches were trained in coaching and motivational interviewing techniques. The study required close monitoring of depressive symptoms; therefore, we decided on having coaches that had obtained at least a Bachelor's degree in Psychology, had completed a clinical course during their education program, and had been taught communication skills, interview techniques, and treatment strategies such that they could better coach and monitor participants and advise those who needed attention or referral. Additionally, we expected that coaches with a degree in psychology are trained in communications skills and would therefore be able to use MI communication skills. The researchers and a licensed psychologist supervised the coaches through weekly meetings in the first month of the study and biweekly meetings thereafter.

At the beginning of the program (for the intervention group) or waiting period (for the control group), the coaches telephoned the participants.

In the intervention group, the coaches introduced and explained technical aspects of the program and stimulated the participants' motivation by motivational interviewing (MI) and general conversational techniques. MI is an evidence-based approach to stimulate behavior change [56, 57]. A weekly telephone call was scheduled for approximately 15 min. During the telephone call, the coaches enquired about the progress of the participant, problems encountered and offered support and motivation and encouraged the participants to continue working on the program. No formal psychotherapy was provided to the participants by the coaches. The coaches kept detailed notes on every interaction with participants. A spreadsheet was used to record every step taken by coaches, decisions made and content of the conversations with the participants.

The maximum coaching period was six weeks, at which point the participant was expected to have completed the program. If the participant had not completed the program

after six weeks, they were allowed to carry-on with the program, however, the coaching stopped.

In the control group, all participants also had a coach but only minimal support was provided for a maximum of six weeks. The weekly telephone calls between coaches and participants in the control condition were scheduled for approximately five minutes. During the phone call, the coaches used motivational interviewing (MI) and general conversational techniques to prevent participants' dropout.

### Ethical Precautions

Coaches monitored the depressive symptoms of all the participants on a weekly basis by asking how the participants were doing. A participant could be referred to a medical doctor, their general practitioner, or the HIV treatment center in case they were showing severe depressive symptoms (PHQ-9 > 20) or suicidal ideation. None of the participants needed a referral. Additionally, adverse events were monitored through weekly calls. Participants were also encouraged to report any adverse events immediately and relatedness to the intervention. Psychological distress was assessed through participant interviews at pre-specified intervals and monitored by the study team.

### Measurements

The primary outcome was depressive symptoms, and the secondary outcome was anxiety symptoms. The questionnaires (available in both English and Setswana) also included several other secondary outcomes, which are outside the scope of this article [see 58]. In addition, questions regarding satisfaction with the intervention were included. More specifically, the following measures were included in the present study.

### Demographic Variables and Other Background Information

Background information was assessed at pre-test (T0). First, demographic variables and personal information were assessed (e.g. gender, age, level of education, etc.). In addition, data with regard to past episodes of depressive and anxiety symptoms, any psychological/psychiatric treatment received for the symptoms and physical health was gathered. Information regarding the HIV infection was also collected, such as date of HIV diagnosis, CD4 cell count, viral load, medication use, adherence to medication, and how satisfied they were with their HIV treatment.

### Patient Health Questionnaire-9 (PHQ-9)

The PHQ-9 was used to measure the severity of participants' depressive symptoms at screening, pre-test, post-test 1, and post-test 2 [59]. The questionnaire has nine items measured on a 4-point scale ranging from 0 (not at all) to 3 (nearly every day). The total score is obtained by adding the scores of the nine items and may range from 0 to 27, with the following cut-offs: score of  $\leq 4$  indicating minimal or no depressive symptoms, 5–9 mild depressive symptoms, 10–14 moderate depressive symptoms, 15–19 moderately severe depressive symptoms and 20–27 severe depressive symptoms. The scale has been widely used for measuring depressive symptoms and has good psychometric properties [59]. In addition, the PHQ-9 is often used with PLWH and has been found to be highly reliable [60]. In Botswana, previous studies support the validity of the PHQ-9 [58, 61] and in phone interview format [62]. In the present study, an alpha reliability of 0.87 was found.

### For Initial Screening Only: Patient Health Questionnaire-2 (PHQ-2)

The PHQ-2 [59] was used for the initial screening of depressed mood in potential participants at the HIV treatment centers (see procedure). The scale is made up of the first two items of the PHQ-9, measured on a 4-point scale ranging from 0 (not at all) to 3 (nearly every day). A total score is obtained by adding the scores of the two items and may range from 0 to 6, with higher scores indicating more depressive symptoms. A score of 1 or higher is considered indicative of potential depressive symptoms. The scale has shown good psychometric properties [60].

### Generalized Anxiety Disorder-7 (GAD-7)

The GAD-7 [61] was used to measure participants' symptoms of anxiety at pre-test (T0), post-test (T1) and post-test 2 (T2). The scale has 7-items that use a four-point scale ranging from 0 (not at all) to 3 (nearly every day). The total score is obtained by adding the scores of the 7 items and may range from 0 to 21. Higher scores indicate more symptoms of anxiety. The following cut-offs are used: score of  $\leq 4$  indicating minimal or no anxiety symptoms, 5–9 mild, 10–14 moderate, and 15 and higher severe anxiety symptoms. The scale has been shown to have adequate psychometric properties [61]. A previous study [58] has reported good psychometric properties for the GAD-7 in a sample of PLH in Botswana. In the present study, an alpha reliability of 0.90 was found.

### User Satisfaction

The following questions were asked at post-test (T1) to determine participants' satisfaction with the self-help program and their coach: (1) If you would evaluate the self-help program with a grade, what number, mark or grade would you give the program? on a scale between 0 (very bad program) and 10 (very good program); (2) Would you recommend other persons to follow this program (answer categories: certainly not, maybe, certainly)?; (3) If you would evaluate your coach with a grade, what number, mark or grade would you give your coach on a scale between 0 (very bad support from the coach) to 10 (very good support from the coach)? The first two questions were only answered by participants from the intervention group. Both groups answered the question about the coach.

### Statistical Analysis

Power analysis according to the methods of Brysbaert [62] and Xi, Pennell, Andridge, and Paskett [63] resulted in a target sample size of  $N=70$  ( $N=35$  per group) based on the following assumptions: a medium to large effect size (Cohen's  $d=0.60$ ), a reliable outcome measure (Cronbach's  $\alpha > 0.80$ ), a pre-post correlation of 0.50, a minimum power of 0.80, and a two-sided significance level  $\alpha$  of 0.05.

Data was analyzed with SPSS software (version 29). We carried out Intention to Treat Analysis (all randomized participants were analyzed) [64]. We used a two-tailed alpha of 0.05 for significance testing. Data analysis was based on pre-test, post-test 1 and post-test 2 scores. Screening scores were not included in the data-analysis.

To investigate baseline differences between conditions at the pre-test, we used chi-square tests, t-tests and ANOVA's.

To investigate differences between conditions (referred to as Group, coded with 1=intervention and 0=control condition) with regard to changes in symptoms of Depression (PHQ-9), and Anxiety (GAD-7), Longitudinal Multilevel Regression Analyzes (LMRA) were applied. Time was treated as a categorical variable in the analysis. The pre-test was used as reference variable (coded with 0). Dummy variables were created for post-test 1 and post-test 2 (both coded with 1), representing short-term and long-term change, respectively (referred to as Short-term and Long-term). As histograms indicated that the distributions of the two dependent variables were all positively skewed, violating the assumptions of LMRA, log transformations were applied for these analyzes. Fixed effects in the analysis were Short-term and Long-term and the interaction of Short-term  $\times$  Group and Long-term  $\times$  Group. Significant interaction effects imply that the conditions differ in their mean change in symptoms at short-term and long-term. The

variable Group was excluded as simple effect in the analysis, implying that the pre-test means for both conditions are constrained to be equal in the analysis. Due to the RCT design, this is a plausible constraint and recommended by Cohen [65]. A random intercept model was used. The Variance Components covariance structure was selected, and maximum likelihood estimation was used to estimate the model coefficients.

Furthermore, Cohen's  $d$  was used to compute the effect size. It was obtained by calculating the difference in mean predicted values (from the LMRA model) between intervention and control condition and dividing this value by the pooled standard deviation. Cohen's  $d$  of 0.20 was considered a small effect, 0.50 a medium effect, and 0.80 and higher a large effect [66].

To assess whether pre-post differences in PHQ-9 and GAD-7 scores reflected 'true' clinical significance, the Jacobson and Truax (JT) approach was applied [67, 68], which included three steps. In step 1, it was determined whether the individual change scores changed from a 'clinical' to a 'normal' status after intervention. For both the PHQ-9 and GAD-7 the cut-off point of 5 was used (see measurements). A change was considered a clinical improvement if the individual's score – from pre-test to post-test – improved from a score higher than (or equal to) the cut-off to a score below the cut-off point. Clinical deteriorations were determined likewise. In step 2, it was determined whether the individual change scores could not be attributed to measurement errors. For this purpose, the Reliable Change Index (RCI) was calculated. The formula for the RCI is:  $[\text{post} - \text{pre-test score}] / \text{se\_dif}$  (standard error of difference). *[Se\_dif was obtained from the formula:  $SD\sqrt{2}\sqrt{1 - r_{xx}}$  with SD referring to the Standard Deviation and  $r_{xx}$  referring to the Cronbach's alpha at pre-test].* Individual RCI values lower than  $-1.96$  were assumed to reflect a significant improvement ( $p < .05$ ), RCI values higher than  $+1.96$  were assumed to reflect a significant deterioration. In step 3, the information of the previous two steps was combined. A change score could only be called a 'true' clinical and significant recovery when both criteria were met: The score had both changed from a 'clinical' to a 'normal' status after the intervention or waiting period, and the RCI was lower than  $-1.96$ . These steps were taken for the individual PHQ-9 and GAD-7 change scores at post-test 1 and post-test 2. Recovery could only be tested for participants that scored above the cut-off at pre-test.

Numbers needed to treat were calculated using the percentage of participants who met the criteria for 'true' clinical and significant recovery. The per-protocol analysis sample was used to calculate clinically significant changes and numbers needed to treat.

The user satisfaction data were analyzed using descriptive statistics. An independent  $t$ -test was used to test differences between the intervention and control groups regarding the grade given to the coach.

## Results

Figure 1 presents the study flow chart. A total of 526 PLWH were screened for depressive symptoms, of whom 345 were screened for eligibility by the researchers. Seventy-two participants completed the pre-test (T0) and were randomly assigned to the intervention group ( $n=37$ ) or the control group ( $n=35$ ). Of the 37 participants assigned to the intervention group, 26 (70%) started the intervention, 19 (51%) completed the first post-test (T1) and 13 (35%) completed the second post-test (T2). Twenty-three (66%) of those assigned to the control group started with the coaching, 15 (43%) completed the first post-test (T1), and 9 (26%) completed the second post-test (T2). Participants dropped out of the trial for various reasons as indicated in the study flow chart (see Fig. 1). Nine participants from the control group started with the intervention after the second post-test (T2).

## Background Characteristics

Table 1 gives the figures for the background characteristics of participants in the intervention and control group at baseline. Females made up 67.0% of the sample. The mean age of the respondents was 48.1 years ( $SD=9.6$ ). The majority (95.8%) of the respondents were taking antiretroviral therapy. The average length of time since the HIV diagnosis was 14.4 years ( $SD=5.44$ ). A history of depression and anxiety was reported by 34.7% and 16.7% of the participants, respectively. In terms of educational background, 41.7% of the participants had no/primary education, and the rest (58.3%) had managed secondary education and further. About half (51.4%) of the participants were unemployed. To investigate differences between conditions, we used chi-square tests,  $t$ -tests and ANOVA's. The only significant difference at baseline was found for employment status; in the intervention group, significantly more people were employed than in the control group.

## Differences Between Intervention and Control Group in Depression and Anxiety Scores Over time

Table 2 presents the observed baseline and post-test mean scores for the PHQ-9 and GAD-7. No baseline differences were found between conditions, as was tested by  $t$ -tests.

Table 3 presents the results of the LMRA analyses (after log transformation of the dependent variables) on

**Table 1** Demographic and other background characteristics of participants in the intervention and control group at pre-test

Characteristic	Total sample (n=72)	Intervention group (n=37)	Control group (n=35)
Age in years, mean(SD)	48.1(9.63)	46.7 (10.51)	49.6(8.47)
Gender, n (%)			
Male	24(33%)	13(35%)	11(31%)
Female	48(67%)	24(65%)	24(69%)
Nationality, n (%)			
Motswana	71(99%)	36(100%)	33(97%)
Zimbabwean	1(1%)	0	1(3%)
Education, n (%)			
No/Primary education	30(41.7%)	15(40.5%)	15(42.9%)
Secondary education and further	42(58.3%)	22(59.5%)	20(57.1%)
Employment, n (%)			
Yes	35(48.6%)*	23(62.2%)	12(34.3%)
No	37(51.4%)	14(37.8%)	23(65.7%)
Marital status, n (%)			
Married/cohabiting	37(52.1%)	21(58.3%)	16(45.7%)
Not married	34(47.9%)	15(41.7%)	19(54.3%)
History of depression, n (%)			
Yes	25(34.7%)	12(32.4%)	13(37.1%)
No	47(65.3%)	25(67.6%)	22(62.9%)
History of anxiety, n (%)			
Yes	12(16.7%)	4(10.8%)	8(22.9%)
No	60(83.3%)	33(89.2%)	27(77.1%)
Time since HIV diagnosis (in years), mean(SD)	14.42 (5.44)	14.95 (4.72)	13.85 (6.16)
AIDS Diagnosis, n (%)			
Yes	2 (2.9%)	1 (2.7%)	1 (3%)
No	68(97.1%)	36(97.3%)	32(97%)
CD4 count, mean(SD)	626.8 (274.6)	693.2 (286.9)	548.2 (241.2)
Antiretroviral therapy, n (%)			
Yes	69(95.8%)	37(100%)	32(91%)
No	3(4.2%)	0	3(9%)

Values are the mean (SD), or n (%). Some percentages are rounded off, therefore, totals may not equal 100

\*Significant difference between intervention and control groups

the differences between the intervention and control group

**Table 2** Observed pre-test and post-test mean scores for PHQ-9 and GAD-7

Primary/secondary outcome measures	Total (M (SD))	Intervention group (M (SD))	Attention-only control group (M (SD))
<b>PHQ-9</b>			
Pre-test	7.71 (6.51) [n=71]	7.84 (6.45) [n=37]	7.58 (6.68) [n=34]
Post-test 1	3.00 (3.43) [n=34]	1.63 (1.86) [n=19]	4.73 (4.20) [n=15]
Post-test 2	2.41 (3.13) [n=22]	0.85 (0.99) [n=13]	4.67 (3.81) [n=9]
<b>GAD-7</b>			
Pre-test	7.63 (5.81) [n=72]	7.41 (15.90) [n=37]	7.86 (5.78) [n=35]
Post-test 1	3.26 (3.17) [n=34]	2.21 (2.07) [n=19]	4.60 (3.85) [n=15]
Post-test 2	3.68 (4.43) [n=22]	1.92 (1.98) [n=13]	6.22 (5.78) [n=9]

These are untransformed mean scores. In the LMR analyses we used the log-transformed scores

**Table 3** LMR analyses: differences between intervention and control group in changes of depression and anxiety symptoms over time

Measure and time point	General time effect				Time by group effect			
	b	SE	t	p value	b	SE	t	p value
<b>PHQ-9 (log-transformed)</b>								
Intercept (pre-test mean)	7.71							
From pre-test to post-test 1	-0.21	0.09	-2.35	0.021*	-0.26	0.11	-2.25	0.027*
From pre-test to post-test 2	-0.19	0.11	-1.68	0.097	-0.43	0.14	-3.04	0.003**
<b>GAD-7 (log-transformed)</b>								
Intercept (pre-test mean)	7.63							
From pre-test to post-test 1	-0.19	0.08	-2.30	0.024*	-0.21	0.10	-2.02	0.046*
From pre-test to post-test 2	-0.11	0.10	-1.08	0.284	-0.34	0.13	-2.63	0.010**

\*:  $p \leq .05$ ; \*\*:  $p \leq .01$ ; \*\*\*:  $p \leq .001$

in changes of depression (PHQ-9) and anxiety symptoms (GAD-7) over time. Pre-post effects were calculated for (short-term) post-test 1 and (longer-term) post-test 2.

With regard to the differences between conditions in mean change in symptoms at the short-term (Table 3; time by group), significant differences were found for both measures; decreases (improvements) in depression and anxiety scores at the short-term were significantly larger in the intervention group than in the control group.

Regarding the changes in symptoms at the long-term, once more, significant differences were found between conditions for both measures. Also on the longer term, the intervention group experienced significantly larger decreases in depression and anxiety scores than in the control group.

### Effect Sizes for the (LMRA) Differences Over Time Between Intervention and Control Group

Both outcomes had large effect sizes for the differences between the intervention and control groups, both in the short and long term. Regarding post-test 1, the following effect sizes were found (Cohen's  $d$ ):  $d=0.76$  for the PHQ-9 and  $d=0.81$  for the GAD-7. Regarding post-test 2, the effect sizes were:  $d=1.38$  for the PHQ-9 and  $d=1.04$  for the GAD-7.

### The Clinical Significance of Individual Changes

Regarding the Jacobson & Truax criteria for 'true' clinical significance of the individual change scores, the following results were found.

With regard to the PHQ-9 change scores from pre-test to post-test 1: Of the 19 participants in the intervention group that completed the first post-test, 11 participants had an initial pre-test score in the 'clinical' range. For 10 of these 11 participants the individual score from pre-test to post-test improved to the 'normal' range (step 1). For 63.6% (7/11) this reflected 'true' significant improvement with an RCI < -1.96 (step 2). This equals an improvement of more than 6.51 points, reflecting 'true' clinical change rather than measurement error (step 3). In the control condition, 9 of 14 participants that completed the first post-test had a pre-test score in the 'clinical' range. Two of them (22.9%) improved to a score in the 'normal' range at post-test with an RCI < -1.96.

With regard to the PHQ-9 from pre-test to post-test 2: 13 participants in the intervention group completed the second post-test; 9 of them had an initial pre-test score in the 'clinical' range; All 9 scored in the 'normal' range at the second post-test, of whom 77.7% (7/9) had an RCI < -1.96, reflecting 'true' clinical improvement. In the control group, of the participants that completed the second post-test ( $n=9$ ) and

also had a pre-test score in the 'clinical' range ( $N=6$ ), 33.3% (2/6) improved to the 'normal' range with an RCI < -1.96.

With regard to the GAD-7 from pre-test to post-test 1: 19 participants in the intervention group completed the first post-test; 11 of them had an initial pre-test score in the 'clinical' range; eight of the 11 (72.7%) scored in the 'normal' range at post-test and had an RCI < -1.96, reflecting 'true' clinical improvement. In the control group, of the participants that completed the first post-test ( $N=15$ ) and also had a pre-test score in the 'dysfunctional' range ( $N=10$ ), 30.0% (3/10) improved to the 'normal' range with an RCI < -1.96.

With regard to the GAD-7 from pre-test to post-test 2: 13 participants in the intervention group completed the second post-test; 8 of them had a pre-test score in the 'clinical' range; Seven of the 8 scored in the 'normal' range at the second post-test and also had an RCI < -1.96 (87.5%), reflecting 'true' clinical improvement. In the control group, of the participants that completed the second post-test ( $N=9$ ) and also had a pre-test score in the 'clinical' range ( $N=6$ ), 33.3% (2/6) improved to the 'normal' range with an RCI < -1.96. There were no significant deteriorations observed in any of the groups.

Regarding the numbers needed to treat for post-test 1: these were 4 and 6 for the PHQ-9 and GAD-7 respectively. For post-test 2, numbers needed to treat were: 3 (PHQ-9) and 4 (GAD-7) (no table).

### User Satisfaction

Most participants were satisfied with the intervention. On a scale of 1–10, their mean grade for the self-help program was 8.26 [SD=1.15;  $n=19$ ]. Sixteen participants (84.2%) would definitely recommend the intervention to others, 2 (10.5%) would maybe recommend it, and 1 (5.2%) would not recommend the intervention. The mean grade they gave for their coach (scale 1–10) was 9.05 [SD=0.19;  $n=19$ ] in the intervention group against 7.47 (1.36;  $n=15$ ) in the control group ( $t(32)=4.07$ ;  $p<.001$ ). No adverse events were reported.

### Discussion

The aim of this study was to investigate whether working on a guided self-help program could effectively reduce depressive symptoms in PLWH in Botswana. The results confirmed that significantly larger decreases in depression symptoms were found in the intervention condition than in the attention-only control condition, both in the short and longer term, with large effect sizes. Also, anxiety symptoms significantly decreased in the intervention group. For a considerable part of the sample, a 'true clinical recovery' was

realized, according to the JT approach. The user satisfaction was high.

This is the first RCT demonstrating that it is possible to achieve a significant reduction in depressive symptoms through a self-help program in booklet format for PLWH in SSA/Botswana. That is an important finding, given the urgency to treat depressive symptoms in PLWH [10, 13, 14] in combination with the lack of mental health services in Botswana and the sub-Saharan region [14, 38–41]. The urgency lies in the knowledge that depressive symptoms have not only been shown to be highly associated with poorer physical health and quality of life [17], but also with increased sexual risk behaviors [3], poorer HIV medication adherence [15], and higher AIDS and mortality rates [18, 19].

Several strengths, limitations and challenges should be noted. One of the strengths was the strong study design of an RCT comparing an intervention group with an attention-only control group. In addition, well-validated questionnaires were used as outcome measures. The results regarding the PHQ-9 and GAD-7 all confirmed that the program was able to reduce symptomatology in the short and longer term, providing confidence in the results. Another strength was that the self-help program in booklet format was based on an existing, evidence-based self-help program with proven effectiveness, which had been adapted to the specific needs of PLWH in Botswana, on the basis of a pre-study/needs assessment carried out among the target group [10]. The high user satisfaction probably reflected the efforts to make the program suitable for this specific group. Another strong point is that the intervention was in booklet format, so that it could reach many people at the same time with minimal stigma. In the current study the self-help program was available in English and Setswana, but it could also easily be translated into other languages for use in other countries. In the study, we added coaching to the program, which was highly appreciated by the participants, both in the intervention and in the control group. By offering some (minimal) coaching in the control condition, we had an active control condition. Because pure waiting-list control conditions might inflate the effects of interventions, we tried to reduce that by using a control condition that was more active than a pure waiting-list control condition. In addition, using an active control group was an effort to have lower drop-out in the control condition and to meet the ethical standards of care.

The first limitation of the study was the high drop-out at post-test 1 and 2 which reduced the power for the analyzes. However, this had been captured by using Longitudinal Multilevel Regression Analyzes, which had the big advantage that all available participants with baseline data could be included in the analyzes for the estimation of model

parameters. A second limitation was that the inclusion of participants was based on screening scores, whereas data-analysis was based on pre-test scores. These scores could differ due to the time in between the measurements. Future studies should keep the time between screening and start of the study as short as possible. Another limitation was that only self-report was used to assess depressive symptoms. This is somewhat overcome by the fact that the self-report measures were all well-validated and widely used with evidence-based cut-off scores. Although a diagnosis of depression was not an inclusion criterion in the current study and interviews would have been too time-consuming for the present study, obtaining the clinical diagnoses would undoubtedly have been a relevant addition to our study. Because of the small sample size, our findings might not be generalizable to all PLWH in Botswana or other SSA countries. Another limitation of our study was the short follow-up period which could have prevented an accurate assessment of the long-term effects of the intervention, potentially underestimating both benefits and harms, as significant outcomes might only become apparent after a longer duration of time following treatment. Additionally, the use of coaches with a bachelor's degree could have limited the study's external validity. This could lead to some treatment sites not adopting the intervention in case of limited individuals with a bachelor's degree to provide coaching. Furthermore, another study limitation related to the difficulty in reaching some participants by phone such that they could not start the intervention for this reason. Therefore, potentially this led to exclusion or reduced participation. Another limitation of the study related to differences in employment status between conditions, which could be a potential confounding factor, given its association with depressive symptoms. Additionally, we did not include adherence to the intervention in our data analysis since we did not include a measure for it. Future studies should use a measure to include this information.

The good news is that we have an intervention with proven effectiveness in reducing depression and anxiety symptoms. Moreover, it is a booklet that can be made easily available to anyone who needs it (printed or as pdf, online), regardless of time, place and presence of care providers. The challenge, however, is to get it to the target group in question and to motivate people to start and complete the intervention. Probably it is most feasible to link implementation of the intervention to the hospitals, the doctors and nurses on site, as almost all PLWH regularly visit the hospital to collect their medication. While our coaches had a degree in psychology, it might be useful to consider training the psychiatric nursing staff and lay-counselors to provide the coaching and conduct motivational interviewing, given the small number of individuals with a degree in psychology

in Botswana. For future research, we recommend a longer follow-up period which would ensure accurate assessment of the long-term effects of the intervention. We recommend only having this longer follow-up for the intervention group, due to ethical reasons [69]. Additionally, we recommend that future studies explore the use of other professionals or lay counselors as coaches to address the issue of external validity. We also recommend that other methods of contacting participants be explored, such as email, or posts to ensure that patients are reached when needed.

In conclusion, the self-help program ‘Living positive with HIV’ was found to be effective in reducing symptoms of depression and anxiety in PLWH in Botswana. The self-help program and the coaching were positively evaluated. The results suggest that many people of the target group could be helped by carefully implementing the program, not only in Botswana, but also in the surrounding countries and probably also in other LMIC countries.

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## Declarations

**Conflict of interest** The authors have no relevant financial or non-financial interests to disclose.

**Ethical Approval** The study was performed in accordance with the ethical standards of the Declaration of Helsinki and its later amendments or comparable ethical standards. This study was approved by the Health Research and Development Committee of the Ministry of Health in Botswana (Ref: HPDME 13/18/1).

**Consent to Participate** Informed consent was obtained from all individual participants in the study.

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## Chapter 6

# Optimizing implementation of an evidence-based self-help intervention program for people living with HIV (PLWH) with depressive symptoms in Botswana.



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## Optimizing implementation of an evidence-based self-help intervention program for people living with HIV (PLWH) with depressive symptoms in Botswana

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### ABSTRACT

An evidence-based self-help program in booklet format has been developed to reduce depressive symptoms among people living with HIV (PLWH) in Botswana. Its effectiveness was evaluated in a Randomized Controlled Trial (RCT), with a sample of 72 PLWH. The program was shown to be effective in reducing depressive symptoms ( $d = 0.76$ ). Good implementation is an important step. This paper aims to present an evidence-based implementation strategy for the booklet self-help intervention. A reflexive methodology was adopted. An implementation model based on the stepwise approach of Versluis et al. ([2020]. SERIES: eHealth in primary care. Part 4: Addressing the challenges of implementation. *European Journal of General Practice*, 26(1), 140–145.) was applied to the present study. Barriers were identified and deductively coded based on the Consolidated Framework for Implementation Research (CFIR) categories. The Expert Recommendations for Implementing Change (ERIC) framework was used to develop implementation strategies to address the identified barriers. Barriers encountered during implementation included costs, lack of screening, lack of trained professionals, etc., with the most important and changeable barrier being the lack of screening and referral into the self-help program. The most important implementation strategies include good collaboration with stakeholders and training of staff and coaches. Standard screening for depressive symptoms is critical to accessing the intervention. A coordinated strategy including stakeholder engagement and ongoing training and support, and structural support is necessary.

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### SUSTAINABLE DEVELOPMENT GOALS

SDG 3: Good health and well being; SDG 4: Quality education; SDG 17: Partnerships for the goals

## Introduction

People living with HIV (PLWH) in Botswana, like those in many developing countries, are highly affected by depressive symptoms (Vavani et al., 2025a). Studies in Botswana are limited, but existing research shows that between 24% and 48% of individuals living with HIV experience depressive symptoms (Brooks et al., 2023; Lawler et al., 2011; Lewis et al., 2012; Vavani et al., 2020). Despite the high rates of depressive symptoms, access to integrated mental health services for PLWH remains limited in Botswana. For instance, Botswana faces a significant shortage of mental health care facilities and human resources to help treat depressive symptoms in individuals living with HIV (Maphisa, 2019). Previous research in Botswana also highlighted some challenges including the lack of on-site HIV care in psychiatric settings and fragmented services, and inadequate integration of patient data between psychiatric and HIV care facilities (Qamabayot & Naidoo, 2023).

Routine screening for depressive symptoms is recommended, especially for patients with chronic conditions such as HIV, as this would allow for timely diagnosis and treatment (Siu et al., 2016). There is no routine screening and diagnosis of depressive symptoms in Botswana and many other developing countries resulting in a treatment gap (Fekadu et al., 2022). A study conducted in Botswana by Molebatsi et al. (2022) reported that clinicians identified several barriers in implementing routine screening of

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depressive symptoms and these include lack of space (interfering with privacy), time constraints, and poor staffing. This significant treatment gap certainly leaves many individuals living with HIV unable to access the necessary care. Therefore, the integration of mental health services into HIV care is crucial based on the consequences of depressive symptoms on overall health outcomes of PLWH (Brooks et al., 2023). Addressing these issues requires increased investment, improved integration of services, and prioritizing mental health care.

Self-help interventions offer a promising solution to address the high prevalence of depressive symptoms among PLWH in Botswana, where mental health services are limited. In a study involving 291 PLWH in Botswana, it was found that 43.4% reported clinically significant depressive symptoms, with many expressing a need for getting psychological help via self-help programs in booklet format (Vavani et al., 2020). The advantages of self-help interventions include accessibility, cost-effectiveness, and the potential to empower individuals to manage their mental health independently (Bower et al., 2001; Matcham et al., 2014; Pandya et al., 2020; Vavani et al., 2025b).

Building on this background, first, a baseline study to investigate the prevalence, risk factors, needs assessment and feasibility of a self-help program to treat depressive symptoms was conducted to give context to the design of an evidence-based self-help program for depressive symptoms among PLWH in Botswana (Vavani et al., 2020). Secondly, based on the findings of the baseline research findings, an evidence-based booklet intervention program to reduce depressive symptoms among PLWH in Botswana was designed (Vavani et al., 2019). Lastly, a randomized controlled trial (RCT) evaluated the cognitive-behavioral based self-help program, “Living Positive with HIV,” delivered through a booklet with coaching (Vavani et al., 2025a).

The “Living positive with HIV” program is an evidence-based program grounded on research that was focused on finding the right targets for intervention (Kraaij et al., 2008; Kraaij et al., 2008; van der Veek et al., 2007; Vavani et al., 2020) and its effectiveness was examined in a Randomized Controlled Trial (Kraaij et al., 2010). This program that focuses on coping skills, goal adjustment, and relaxation techniques and is designed to improve depressed mood has shown effectiveness in reducing depressive symptoms among PLWH in Botswana (Vavani et al. 2025a). We found a large effect size for the difference between the intervention and control group, both in the short and long term. The effect size (Cohen’s  $d$ ) for the first post-test was  $d = 0.76$  for the Patient Health Questionnaire-9 (PHQ-9). At the second post-test, the effect size was:  $d = 1.38$  for the PHQ-9.

Initial screening of patients to assess elevated depression scores was conducted by either nursing consultants or researchers when the patients arrived for their regular visits to the HIV treatment centers. A screening form was developed by researchers based on the PHQ-2 (Kroenke et al., 2003) for the initial screening. Patients had to score at least 1 to be eligible for further screening by researchers. The program is offered with the addition of a coach to help enhance motivation and lower drop-out, as well as to monitor depressive symptoms’ severity. Its development marks a significant step forward in addressing the mental health treatment gap for people with HIV in low-resource settings like Botswana. Integrating such interventions into HIV care could improve treatment adherence and overall well-being, addressing both the psychological and physical health needs of PLWH in Botswana.

The next crucial step is the implementation of the self-help depression intervention for PLWH in Botswana, with a strong focus on ensuring optimized uptake and long-term sustainability. To achieve this, it is essential to develop and build an evidence-based implementation strategy that considers the Botswana context, the health-care system capacity, and the needs of both patients and service providers. This implementation strategy should take into account key factors such as integration into existing HIV care structures, training of lay facilitators or coaches (based on low human resources), mechanisms for monitoring and evaluation and many others. This way we can enhance the scalability and long-term effectiveness of the intervention, ultimately improving mental health outcomes for people living with HIV in Botswana and other developing countries.

To develop an evidence-based implementation strategy for self-help depression interventions among people living with HIV in Botswana and perhaps other developing countries, Versluis et al. (2020) provide a stepwise approach to find implementation strategies for self-help programs (originally for eHealth programs). The aim of this study is to use this stepwise approach to develop an implementation strategy for our self-help program to reduce depressive symptoms in Botswana.

## Methods

### Study design

This paper adopts a reflexive methodology (Olmos-Vega et al., 2023) to examine barriers encountered during the RCT that evaluated the CBT-based self-help program aimed at reducing depressive symptoms among people living with HIV in Botswana. We engaged in critical reflection throughout the project both on the intervention and on the roles of researchers and practitioners within it. Through this reflexive approach, we also reflect on potential implementation barriers that may be encountered. To guide the development of an implementation plan, we applied the five-step approach proposed by Versluis et al. (2020). Table 1 presents the steps outlined by Versluis et al. (2020).

### Identification of barriers using CFIR

To explore the contextual and structural factors that influenced implementation, we employed the CFIR (Damschroder et al., 2022) in step 2 of the Versluis approach. Sources of information included the research team's notes, informal conversations with site representatives (nurses, doctors, hospital superintendent, DHMT representatives), and field notes of the coaches and researchers. The site partners included staff from the Princess Marina Hospital, Nyangabgwe Referral Hospital, Selibe-Phikwe Government Hospital, and three health posts at Selibe Phikwe. The information from discussions and notes was deductively coded using CFIR's five domains (intervention characteristics, outer setting, inner setting, characteristics of individuals involved in the intervention, and implementation process). Domains were assessed qualitatively using observations, project notes, and team reflections, guided by Versluis et al. (2020). These observations were guided by the definitions provided by Versluis et al. (2020) in Appendix 1 and grouped accordingly.

### Selection of implementation strategies using ERIC

Building on the CFIR-deduced barriers, we selected implementation strategies using the ERIC framework (Powell et al., 2015). We aligned the identified barriers with corresponding ERIC strategies. Strategies were chosen based on theoretical fit, perceived feasibility and appropriateness within the context of HIV care delivery in Botswana.

This paper is based on experiences from the RCT study to evaluate the effectiveness of the CBT-based self-help program for depressive symptoms in people living with HIV in Botswana. The RCT was approved

**Table 1.** Stepwise approach to implementation (adapted from Versluis et al., 2020).

Step	Description	Frameworks
1. Specify the Intervention	Clearly define the self-help depression intervention, detailing its components, delivery methods, and intended outcomes.	Versluis et al., (2020)
2. Define the Problem	Identify challenges and gaps in current HIV mental health care in Botswana. Prioritize important and changeable problems. Barriers and facilitators are categorized into CFIR domains: <ol style="list-style-type: none"> <li>i Intervention characteristics (e.g., costs, complexity);</li> <li>ii Outer setting (e.g., policies);</li> <li>iii Inner setting (e.g., training, support);</li> <li>iv Individual factors (e.g., attitudes, privacy concerns);</li> <li>v Implementation process (e.g., other players).</li> </ol>	CFIR (Damschroder et al., 2022)
3. Specify Desired Implementation Behavior	Define the specific actions stakeholders (healthcare providers, patients, community workers) must take for successful implementation. The AACTT framework (Action, Actor, Context, Target, Time) is used to clarify roles, settings, targets, and timeframes. This increases accountability and facilitates monitoring.	AACTT (Presseau et al., 2019)
4. Choose Implementation Strategy	Select strategies from the ERIC framework to address barriers and promote desired behaviors. The ERIC framework organizes 73 + strategies to support adoption, uptake, and sustainability of interventions.	ERIC (Powell et al., 2015)
5. Evaluate the Implementation Strategy	Assess the effectiveness of strategies through monitoring and evaluation to ensure short- and long-term outcomes are achieved.	Powell et al., (2015)

by the Health Research and Development Committee of the Ministry of Health in Botswana (Ref: HPDME 13/18/1). The clinical Trial was registered with the Netherlands Trial registry, number NTR5407 on August 23, 2018.

## Results

This section presents findings from a reflexive analysis of barriers that were encountered during the RCT that evaluated the CBT-based self-help program for depressive symptoms in people living with HIV in Botswana as well as the barriers likely to be encountered in the implementation of the program. This section also presents implementation strategies to help address the identified barriers. The section is structured according to the steps of the Versluis et al. (2020) implementation process model.

### *Step 1: Specify the intervention*

The intervention refers to our CBT-based self-help intervention “Living positive with HIV” in booklet format, provided with minimal coaching (5–15 min per week), which was proven effective in reducing depressive symptoms among people living with HIV in Botswana (Vavani et al., 2025a). The goal of the intervention is to reduce depressive symptoms among people living with HIV. Screening is an important part of the program. Patients were initially screened for depressive symptoms using the PHQ-2 (Kroenke et al., 2003) by either nursing consultants or the researchers when the patients arrived for their regular visits to the HIV treatment center. Patients had to score at least 1 on the PHQ-2 and to be eligible for further screening by the researchers. Patients who volunteered and consented to participate were screened further by the coaches over the telephone, using the PHQ-9 (Kroenke et al., 2001). Additional inclusion criteria were: being at least 18 years old, having an HIV diagnosis longer than half a year, having access to a telephone, ability to read and understand Setswana or English, no severe cognitive limitations (such as severe forgetfulness or mental confusion) and no current treatment by a psychologist or psychiatrist. Seventy-two (72) participants completed the pre-test and were randomly assigned to the intervention group ( $n = 37$ ) or the control group ( $n = 35$ ). Females made up 67.0% of the sample and the mean age of the respondents was 48.1 years ( $SD = 9.6$ ).

The content of the self-help program contains: activation, relaxation, changing maladaptive cognitions, and the attainment of new personal goals. This content is covered over six lessons to be completed in maximum eight weeks and uses a combination of psychoeducation, assignments, and exercises. The participants worked on the program for 1–2 hours every week for six weeks. The following lessons are included in the booklet: Lesson 1, providing an introduction to the program and an exercise on activation; Lesson 2, focusing on physical relaxation; Lesson 3, focusing on changing negative thoughts; Lesson 4: teaching strategies to stop unpleasant thoughts; Lesson 5, helping to find new, meaningful, concrete and time-bound life goals; Lesson 6: helps to get self-confidence to achieve valuable goals. Each participant was paired with a coach. Coaches had a bachelor’s degree in psychology, had taken and completed a clinical course during their education program, and had been taught communication skills, interview techniques, and treatment strategies. This was to ensure that coaches could better coach, monitor participants and advise those who needed attention or referral. The coaching took 5–15 mins on average per week, and the focus was on motivating the participant. A licensed psychologist supervised the coaches, initially through weekly meetings in the first month of the study, thereafter on a biweekly basis.

Conclusion step 1: The intervention package consists of the intervention itself, but also the screening package to refer people to the program and the coaching provided. We have a culturally sensitive package that has been proven to be effective.

### *Step 2: define the problems encountered and anticipated*

In step 2, we first reflect on the problems/barriers that we encountered during our study and subsequently other implementation problems/barriers that we anticipate. We will describe this per domain.

**Domain 1: intervention characteristics**

**Costs.** The overall costs for the implementation of the program were low, however, we still identify costs as a potential problem/barrier to implementation. During the implementation, we needed money to print the booklets and screening forms, for transportation of the intervention materials, phone calls for coaching and to pay coaches for their service [if not volunteers or students]. Additionally, training coaches requires a significant investment of time which carries associated financial implications. During the study (RCT) phase, the University of Botswana covered these expenses, however, funding from the University will not be available during the implementation phase.

**Domain 2: outer setting:**

**External policies and incentives.** We identified governmental and organizational policies as barriers to implementation; specifically, we observed incoherence in multidisciplinary team's care and management of patients which was partly influenced by a lack of support and referral mechanisms/ structures for mental health issues within the hospitals and treatment centers or awareness thereof. While we have the Mental Health Act of 2023 (Government of Botswana, 2023) and the National Policy on Mental Health (Ministry of Health, 2003) in Botswana, which both guide the care, treatment and provision of services for persons with mental health conditions, these policies are not fully implemented at treatment sites.

**Domain 3: inner setting**

**Fit in organization and work progress.** Barriers at this domain included: lack of staff to facilitate screening and referral, high staff mobility (nursing staff moved to other departments or different hospitals), lack of space to conduct screening, time constraints for hospital staff and patients (competing priorities), lack of integration between HIV and mental health, and difficulty reaching participants due to poor and/or inconsistent mobile network (contributing to some participants not joining the intervention or dropping out).

**Training and support.** Lack of training of hospital staff in screening and identifying patients with mental health issues was also identified as a barrier to implementation.

**Domain 4: characteristics of the individuals involved in the intervention**

**Attitudes and beliefs.** We identified stigma around mental illness which could have led to some potential participants not joining the intervention.

**Concerns about privacy.** Because there was a lack of space, screening took place in triage rooms, resulting in lack of privacy as there were usually other patients and nursing staff in the room. In addition, some patients shared a phone (e.g., with a spouse or family member) also resulting in lack of privacy.

**Lack of knowledge and skills.** Low mental health literacy among both patients and providers was identified as a barrier to implementation, as it can lead to a lack of recognition of symptoms, potentially reducing referral into the program and engagement with the intervention as well as limited confidence when screening by providers or seeking mental health support for patients.

**Domain 5: implementation process**

**Involvement of key stakeholders.** Barriers include lack of engagement of stakeholders in the implementation (i.e., we received little help with the screening of patients), and lack of engagement of "higher-level" stakeholders (e.g., at some sites, we experienced some delays and/or rejection due to delayed communication from management regarding our research or lack of engagement of the higher-level stakeholders despite having obtained official research approval from the relevant Ministry).

**Conclusion step 2 (domain 1–5): most important and changeable problem**

We identified proper and private screening for depressive symptoms and referral to the self-help program in the hospitals as the most important and changeable problem. In step 3, we will use the AACTT to clearly define the components of screening and referral behaviors by breaking it down into five elements.

### **Step 3: specify desired implementation behavior (AACTT)**

To support effective implementation, it is important to involve important stakeholders and train staff and coaches (Action); the research group (Actor) will lead efforts to involve key stakeholders and provide the necessary training for medical staff; these activities will take place at HIV treatment centers and in collaboration with governmental and non-governmental organizations (Context); the primary targets of these efforts are both PLWH who experience depressive symptoms and the medical staff responsible for their care, as well as the coaches (Target); ideally, stakeholder engagement and staff training will occur prior to the launch of the intervention and be repeated every six months, depending on available funding (Time).

### **Conclusion step 3**

Good collaboration with all stakeholders and training of patients, staff and coaches is essential to facilitation of screening for depressive symptoms and referral into the program.

### **Step 4: choose implementation strategy**

Based on the list of Powell et al. (2015), Table 2 presents a list of implementation strategies for screening depressive symptoms at HIV treatment sites that have been identified as feasible.

Conclusion step 4: to support successful implementation of the screening process, we selected the four (4) most critical strategies that we believe will maximize feasibility while encircling elements of the intervention and include all other strategies identified. These top four strategies include accessing funding, building a coalition, conducting ongoing educational meetings, and conducting ongoing training (every six months).

### **Step 5: evaluate implementation strategy**

To support the effective implementation of the intervention, a structured monitoring and evaluation plan must be applied across selected ERIC strategies. We recommend evaluating the implementation strategy annually to ensure proper implementation and desired outcomes. This paper does not describe a comprehensive monitoring and evaluation strategy. However, several monitoring and evaluation approaches can be used. These include periodic progress reviews, stakeholder feedback instruments, pre/post-training assessments, participant satisfaction surveys, meeting documentation, technical assistance logs, budget tracking, partnership effectiveness reviews, patient adherence data, champion activity reports, and supervision logs.

## **Discussion**

This study aimed to reflect on the implementation process of a CBT-based self-help intervention for depressive symptoms in people living with HIV in Botswana, with a particular focus on identifying barriers and relevant implementation strategies. Guided by the Versluis et al. (2020) model, our findings highlight the critical role of effective screening and referral procedures (Step 2) in ensuring that individuals with depressive symptoms are identified early and linked to appropriate care. Our observations highlighted large gaps, particularly in screening across treatment sites resulting in most treatment centers having failed to assist with screening. This finding is consistent with previous research by Molebatsi et al. (2022) who found that screening of depressive symptoms was a barrier in terms of access to treatment as well as Fekadu et al. (2022) who concluded that there was no routine screening of depressive symptoms in Botswana's clinics. Routine screening for depressive symptoms is identified as a critical step in ensuring timely diagnosis and access to the intervention (Siu et al., 2016). These findings indicate the need for well-trained staff, and consistent engagement with health facilities, hospital management, governmental and non-governmental agencies to support ongoing efforts to screen and strengthen early identification and linkage to care, which would also ensure alignment and implementation of Botswana's mental health act and national policy on mental health.

Despite the overall feasibility and effectiveness of the intervention, several other potential challenges remain that could impact broader implementation. While our intervention is low-cost, funding constraints

**Table 2.** ERIC implementation strategies.

ERIC strategy number	Eric strategy	Description and application of the strategy
1	Access new funding	Access new or existing money to facilitate the screening of depressive symptoms; printing of screening forms, transportation of the forms to clinics, phone calls for screening over the phone, wages for coaches for their service, and training costs.
4	Assess for readiness and identify barriers and facilitators	Assess various aspects of participating organizations (treatment centers / clinics) to determine the degree of readiness to implement, barriers that may impede implementation, and strengths that can be used in the implementation effort (e.g., availability of space, trained staff etc.)
6	Build a coalition	Recruit and cultivate relationships with partners in the implementation effort (e.g., hospital management, medical staff, Ministry of Health)
11	Change physical structure and equipment	Evaluate current configurations and adapt, as needed, the physical structure and/or equipment (e.g., changing the layout of rooms to give more privacy) to best accommodate the screening of depressive symptoms.
15	Conduct educational meetings	Hold meetings targeted toward different stakeholder groups (e.g., providers, administrators, other organizational stakeholders, and community, patient/consumer, and family stakeholders) to teach them about the screening and intervention. Meetings to be held pre-launch and ongoing to cater for staff mobility and new patients.
19	Conduct ongoing training	Plan for and conduct training of the intervention, screening, referral and coaching in an ongoing way.
23	Develop a formal implementation blueprint	Develop a formal implementation blueprint that includes all goals and strategies. The blueprint should include the following: (1) aim/purpose of the implementation; (2) scope of the change (e.g., what organizational units are affected); (3) timeframe and milestones; and (4) appropriate performance/progress measures. Use and update this plan to guide the implementation effort over time.
29	Develop educational materials	Develop and format manuals, toolkits, and other supporting materials in ways that make it easier for stakeholders to learn about the innovation and for clinicians to learn how to deliver the screening and referral (e.g., a training kit for staff, coaches and patients).
30	Develop resource sharing agreements	Develop partnerships with organizations that have resources needed to implement the intervention (e.g HIV agencies and NGOs).
35	Identify and prepare champions	Identify and prepare individuals who dedicate themselves to supporting, marketing, and driving through the implementation, overcoming indifference or resistance that the intervention may provoke in an organization.
48	Organize clinician implementation team meetings	Develop and support teams of clinicians who will implement the screening and give them protected time to train, screen and reflect on the implementation effort, share lessons learned, and support one another's learning.
53	Provide clinical supervision	Provide clinicians with ongoing supervision focusing on the screening and referral processes. Provide training for clinical supervisors who will supervise clinicians who provide conduct the screening.
71	Use train-the-trainer strategies	Train designated clinicians or organizations to train others to screen for depressive symptoms and on referral procedures.

are a concern, particularly for printing of screening and intervention materials, ongoing training, coaching, and the adaptation of physical spaces where privacy for screening is essential. Concerns with physical space were also identified in the study by Molebatsi et al. (2022). Another anticipated challenge is maintaining staff engagement over time due to high staff mobility, as well as time constraints, especially in large clinics where health workers are overwhelmed and already stretched thin. The integration of screening and referral procedures into existing workflows was affected by time limitations, competing priorities, and poor coordination between HIV and mental health services. Furthermore, other challenges such as inconsistent mobile network coverage made it harder to reach participants for follow-up, especially in more remote areas. Stigma surrounding mental illness appeared to discourage some eligible participants from engaging with the intervention. Additionally, low mental health literacy among both patients and some providers may have limited understanding of the intervention's purpose and benefits. Addressing these barriers is critical prior and during the intervention implementation phase. There is a need for continued training, continuing engagement with stakeholders, ongoing provision of educational materials, supervision and motivation for staff to ensure that the efforts towards screening and referral continue.

Nonetheless, several facilitators helped strengthen the feasibility of our approach. During site visits and discussions with hospital staff, we observed high levels of enthusiasm and a clear need for accessible, low-intensity mental health interventions. The intervention itself was perceived as acceptable and feasible by both providers and patients such that results from our RCT (Vavani et al., 2025a) showed significant reductions in depressive symptoms. Coaching was particularly well received both in intervention and

control groups, demonstrating the value of ongoing support and motivation for patients in reducing drop-out. These facilitators provide a solid foundation for scale-up, especially if paired with targeted efforts to address structural issues identified as well as time constraints and high staff mobility.

Future research should prioritize the evaluation of implementation by focusing on outcomes such as sustainability, and cost-effectiveness of the intervention when implemented at large scale. As outlined in Step 4 of the Versluis model, identifying ways to sustain funding will be critical in integrating the intervention into routine care. We recommend that implementation research should also explore the adaptability of the intervention across different facility types and populations. We also recommend building partnerships with local NGOs and HIV service providers who may be willing to share resources and can facilitate delivery of the intervention in communities.

One key limitation of this study is the reflexive methodology applied which is inherently subjective, because the analysis is shaped by the researchers' interpretations and values (Olmos-Vega et al., 2023). Therefore, while reflexivity allows for critical engagement, it also raises questions about the replicability and generalizability of findings. Future research should consider using other methods or a combination of effectiveness-implementation designs (Curran et al., 2012), where implementation can be evaluated at the same time when evaluating the intervention. Perhaps, mixed methods research, that includes both quantitative data and qualitative data from patients, providers, and stakeholders, would provide a deeper understanding of implementation barriers and facilitators as well as user experiences (Palinkas et al., 2011).

In conclusion, this paper highlights both the positives and challenges of implementing psychological interventions in routine HIV care in a developing country. While screening and referral systems are critical to successful implementation, there is need for a coordinated strategy that includes stakeholder engagement and ongoing training and support, as well as structural support. The lessons learned through this process will inform future efforts to deliver accessible, sustainable mental health care to underserved populations like those in Botswana and other developing countries.

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### Author contributions

CRediT: **Boitumelo Vavani**: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Validation, Visualization, Writing – original draft, Writing – review & editing; **Nadia Garnefski**: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing; **Philip Spinhoven**: Writing – review & editing; **Kennedy Amone-P'Olak**: Writing – review & editing; **Tshepiso Teseletso**: Writing – original draft, Writing – review & editing; **Vivian Kraaij**: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

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## Chapter 7

### Summary and general discussion



## **General summary**

Based on the identified gaps between mental health issues and the availability of treatment options in low- and middle-income countries (LMICs), this dissertation aimed to investigate the development, effectiveness, and implementation of a CBT-based self-help intervention targeting depressive symptoms among people living with HIV (PLWH) in Botswana. To achieve this main objective, five related studies were conducted. Firstly, a meta-analysis was conducted to investigate the effectiveness of self-help programs in treating depressive symptoms in LMICs. Secondly, we identified specific intervention targets to set the foundation for developing effective interventions to treat depressive symptoms among PLWH in Botswana, to ensure that a subsequent intervention would be grounded in the lived experiences and mental health needs of the target population. Thirdly, based on the findings of the second study, a self-help intervention for depressive symptoms among PLWH in Botswana was developed and a Randomized Controlled Trial (RCT) protocol was published. Fourth, an RCT was conducted to investigate the effectiveness of this CBT-based self-help intervention to reduce depressive symptoms among PLWH in Botswana. Lastly, the dissertation presented the implementation challenges experienced during the RCT, and these informed the development of an evidence-based implementation strategy for the self-help program to reduce depressive symptoms in Botswana.

## **Summary of main findings**

**Chapter 2** reports on findings of the meta-analysis which investigated the pooled effect of self-help interventions for people with depressive symptoms in LMICs in the short and long term. The meta-analysis also investigated characteristics that may affect the effectiveness of these psychological interventions. The databases of PubMed, Cochrane Register of Randomized Controlled Trials, PsycINFO, Embase, and Sabinet were searched between June 2021 and December 2022 to select studies that met pre-defined inclusion criteria. A coding protocol was developed and used to retrieve and code all relevant data from the selected studies. We measured publication bias and assessed the study quality using the Cochrane Risk of Bias tool.

Eighteen (18) RCT studies with 3,532 participants from low- and middle-income countries (LMICs) were analyzed to evaluate the effectiveness of self-help psychological interventions for reducing depressive symptoms. The results indicated that self-help interventions have a medium positive effect on depressive symptoms at post-test and an even larger effect size at follow-up. The effect sizes found in this meta-analysis were comparable to those reported in other recent meta-analyses, however, there was evidence for publication bias, which led to a smaller effect size when corrected. Overall, five characteristics influenced the effectiveness of a treatment for depressive symptoms in LMICs. Larger effects were found for studies that 1) were conducted in lower-middle income countries when compared to higher-middle income countries, 2) that had at least mild depression as inclusion criterion compared to no depression screening at baseline or only severe depression as inclusion criterion, 3) that reported less than 30% attrition, 4) that did not use relaxation techniques and 5) that used a booklet form of intervention compared to smartphone apps.

This meta-analysis is one of the few conducted on self-help interventions in LMICs. Considering the growing burden of depressive symptoms and the need for immediate treatment, this meta-analysis is timely. The findings highlighted the potential to integrate cost-effective self-help interventions into clinical practice in low-resourced countries, thereby reducing the need for extensive human resources.

Based on the results of this meta-analysis, we recommend screening for depressive symptoms at baseline as a critical step to facilitate referral to interventions that treat or reduce depression in LMICs. Future studies should also investigate the reasons for high attrition in self-help interventions to retain more participants and improve mental health outcomes, thus increasing the power of the studies. It is also recommended that research explores different intervention formats (e.g., booklets or internet-based formats), as well as specific guidance aspects (e.g., feedback, motivation, and clarification), or no guidance, to determine which might improve intervention effects. Lastly, future studies could investigate specific components of CBT techniques or other treatment modalities to identify components that are more effective in treating depressive symptoms.

**Chapter 3** investigated targets for intervention. In this chapter we aimed to provide the prevalence rate of depressive symptoms among PLH in Botswana, to assess their self-expressed mental health treatment needs and wishes, and to study the relationships between cognitive and behavioral coping strategies and depressive symptoms. We conducted a cross-sectional study and included a sample of 291 participants, with the majority being female (73%). The study sites included 8 HIV treatment centers from Botswana. To collect data, participants completed standardized questionnaires on depressive symptoms (CES-D), coping strategies (CERQ, BERQ), and additional questions regarding the participants' mental health care needs and wishes. The findings indicated that 43.4% of participants reported clinically significant depressive symptoms. We found no gender differences in the study indicating that depressive symptoms equally affect both men and women living with HIV in Botswana. The mental health needs expressed by the majority of participants included help with feelings of depression, physical tension, finding new goals and coping with HIV. In addition, participants indicated to prefer a self-help program in a booklet format over online formats or smartphone applications. The analysis also showed that the coping strategies of rumination, catastrophizing, withdrawal, which are considered maladaptive, had a significant positive relationship with depressive symptoms while positive refocusing and refocus on planning, which are considered adaptive, had a significant negative relationship with depressive symptoms.

Overall, the study revealed that the prevalence of depressive symptoms among PLWH in Botswana is quite high. Depressive symptoms among PLWH in Botswana demand urgent intervention. Based on the findings of chapter 3, intervention programs for PLWH in Botswana would need to target maladaptive coping strategies of rumination, catastrophizing and withdrawal and to teach adaptive strategies such as positive reappraisal and refocus on planning. Furthermore, the findings suggest that a self-help program in a booklet format with personal contact would suit the needs of PLWH in Botswana.

**Chapter 4** contains the study protocol. Based on empirical findings of the study presented in chapter 3 that investigated intervention targets for PLWH in Botswana, a self-help program with coaching

in booklet format in the Setswana and English languages was developed, composed of cognitive behavioral techniques, coping skills interventions, and goal adjustment training. In this chapter, we described a randomized controlled trial that was later conducted to compare the booklet self-help program that includes coaching with an attention-only control condition. In the study protocol, we described the required number of participants with mild to moderate depressive symptoms. We also described the self-help program and its main components: activation, relaxation, changing maladaptive cognitions, and the attainment of new personal goals. The content of the program is covered over six lessons to be completed in a maximum of 8 weeks. The program uses a combination of psychoeducation, assignments, and exercises. The participants are expected to work on the program 1-2 hours every week for 6 weeks (maximum 8 weeks). Coaches are available to offer support and motivate the participants. For both groups, depressive symptoms and possible mediators were to be measured three times during the intervention, and at pre-test, post-test, and follow-up. This chapter outlined the planned statistical analysis for the RCT.

**Chapter 5** presents the findings of the RCT that examined the effectiveness of a guided self-help program in reducing depressive symptoms in PLWH in Botswana. A total of 72 participants were enrolled (37 intervention group, 35 control group). Baseline characteristics were similar across groups except for employment status; there were significantly more people employed in the intervention group compared to the control group. Longitudinal multilevel analyses showed that, compared with the control group, the intervention group experienced significantly greater reductions in both depressive symptoms and anxiety at post-test and follow-up. Between group effect sizes were large for both depressive symptoms and anxiety symptoms. Using Jacobson-Truax criteria, a significantly larger part of those in the intervention group realized a ‘true clinical recovery’ for both symptoms of depression and anxiety. No participants in either group showed clinically significant deterioration. User satisfaction was high, and most participants indicated that they would recommend the program to others.

The findings of this RCT demonstrate that it is possible to achieve a significant reduction in depressive symptoms through a guided self-help program in booklet format for PLWH in Botswana and other LMICs. Overall, our self-help program demonstrated high effectiveness in reducing depressive and anxiety symptoms among PLWH in Botswana. The findings suggest that a low-cost, scalable, minimally staffed mental health intervention can significantly address the psychological burden among PLWH in low resource settings. The booklet could be made easily available to anyone who needs it (also converted to other formats e.g. online), regardless of time, place and presence of care providers. Probably it is possible to link implementation of the intervention to the hospitals, the doctors and nurses on site, as almost all PLWH regularly visit the hospital to collect their medication.

**Chapter 6** aimed to reflect on the implementation process of the CBT-based self-help intervention for depressive symptoms in PLWH in Botswana, with a particular focus on identifying barriers and relevant implementation strategies. Guided by the Versluis et al. (2020) model, our findings highlighted the critical role of effective screening and referral procedures in ensuring that individuals with depressive symptoms are identified early and referred to appropriate care. Our observations highlighted large gaps, particularly in screening across treatment sites resulting in most treatment centers having failed to assist with screening.

This finding is consistent with previous research that showed that a lack of screening of depressive symptoms was a barrier in terms of access to treatment and that there was no routine screening of depressive symptoms in Botswana's clinics. The findings of this study also indicate the need for well-trained staff, and consistent engagement with health facilities, hospital management, governmental and non-governmental agencies to support ongoing efforts to screen and strengthen early identification and referral to care or intervention. These actions would also ensure the implementation of Botswana's mental health act and national policy on mental health.

In conclusion, this chapter highlights both opportunities and challenges of implementing psychological interventions in routine HIV care in a developing country. While screening and referral systems are critical to successful implementation, there is need for a coordinated strategy that includes stakeholder engagement and ongoing training and support, as well as structural support. The lessons learned through this process will inform future efforts to deliver accessible, sustainable mental health care to PLWH in Botswana and other developing countries where resources are limited.

### **General discussion**

This dissertation aimed to address the wide gap between mental health needs and the accessibility of evidence-based psychological interventions in low-and middle-income countries (LMICs), with a specific focus on PLWH in Botswana. Depressive symptoms are highly prevalent among PLWH, however, mental health services remain scarce, difficult to access, and often overstretched (Maphisa, 2019). Consequently, many people who need mental health services in LMICs remain undiagnosed, untreated or undertreated. By systematically examining previous studies, identifying the needs of the target population, developing an evidence-based intervention, testing its effectiveness, and exploring the challenges surrounding its implementation, the dissertation provides a comprehensive guide to understanding how self-help programs can be implemented and integrated within mental health and HIV related care in Botswana and similar LMIC settings. Through the five studies presented in this dissertation, several themes emerge and these include: 1) the increasing evidence supporting feasibility and effectiveness of self-help interventions for low-resourced countries; 2) the critical importance of contextualization; 3) the central role of screening and referral; 4) the significance of coaching; 5) the need for an evidence-based implementation plan for sustainability.

#### *Self-help interventions can potentially bridge the mental health treatment gap in LMICs*

The meta-analysis provides an important overview of the current evidence on self-help interventions for depressive symptoms in LMICs. The results confirm that self-help interventions yield medium positive treatment effects at post-test and even larger effects at follow-up, suggesting that their benefits may be more consolidated over time, perhaps as individuals continue to apply learned coping skills. In their study on long term effectiveness of online self-help interventions, van Luenen, Garnefski, Spinhoven, and Kraaij (2023), found that the reductions in depressive symptoms observed in the short term were sustained over the long term (3-4 years) supporting the idea that self-help interventions may retain the results in the long term. These findings are particularly relevant for LMICs, where human resources for mental health care remain severely

limited (Maphisa, 2019; Qambayot & Naidoo, 2023) as they underscore the need for interventions that produce sustained, long-term impact and ultimately reduce the demand for mental health services.

In our meta-analysis, several characteristics significantly influenced treatment outcomes. Firstly, interventions conducted in lower-middle income countries demonstrated larger effects than those from upper-middle income settings, which could reflect greater unmet mental health needs and less access to existing mental health services. Secondly, interventions that screened participants for at least mild depressive symptoms demonstrated stronger effects than studies with no screening or those targeting only severe depressive symptoms. This highlights the importance of appropriate inclusion criteria and early identification of depressive symptoms (Elias, Seward & Lund, 2024). Thirdly, studies with lower attrition (<30%) produced larger effects, highlighting the benefits of maintaining participant engagement and adherence in self-help programs (Alagarajah, Ceccolini, & Butler, 2024). It may be important to support adherence and find ways to motivate participants to remain committed to the intervention. Fourth, interventions presented in booklet format performed similar to internet-based interventions but better than interventions using smartphone applications (apps). This finding is however contradictory to other research that shows that applications supported interventions are effective in the treatment of depressive symptoms (Linardon, Cuijpers, Carlbring, Messer, & Fuller-Tyszkiewicz, 2019). It could be that in LMICs, more traditional digital platforms or booklets may be more effective and reflect access issues to certain gadgets and internet. Lastly, interventions without relaxation techniques produced larger effects, aligning with Furukawa et al. (2021). These findings possibly suggest that other core CBT components, such as activation or cognitive restructuring may be more important in causing change in our intervention when compared to relaxation exercises.

These findings highlighted several implications for the development and evaluation of self-help interventions in LMICs. Screening for depressive symptoms is particularly suggested as an important consideration before referral of individuals to interventions and this should be standard practice. Researchers must also prioritize understanding and addressing attrition because high dropout rates can affect internal validity as well as the actual impact of the intervention. Research suggests offering monetary compensation and using in-person enrolment methods to lower attrition rates (Linardon, 2023). Additionally, it is important to understand components of CBT that seem to cause change in participants from LMIC contexts. It has been suggested that change mechanisms could be culturally bound (Naeem, Sajid, Naz, & Phiri, 2023).

#### *One size does NOT fit all: understanding the importance of contextualization*

The cross-sectional study explored the specific mental health needs and preferences of PLWH in Botswana. The findings revealed an alarming prevalence of clinically significant depressive symptoms (43.4%), further emphasizing the urgency of developing psychological interventions for this population. Importantly, depressive symptoms affected men and women equally, indicating that treatment strategies must be inclusive of all PLWH. Participants expressed interest in receiving help for depressive symptoms, physical tension, coping with HIV, and redefining personal goals. Preferences for a self-help program

delivered in booklet format correspond with the findings from the meta-analysis and indicate that more traditional (less technology), structured, and tangible materials may be particularly acceptable and feasible in the Botswana context. These preferences may also reflect barriers like limited digital access and literacy in LMICs and privacy concerns that sometimes are associated with online platforms (Nirmani, 2025).

This study also identified key maladaptive coping strategies including rumination, catastrophizing and withdrawal that were strongly associated with higher depressive symptoms. Conversely, positive refocusing and refocus on planning were linked with fewer depressive symptoms. Several studies have identified maladaptive coping strategies as related to depressive symptoms in other LMICs (e.g. Parcesepe et al., 2023; Zeleke et al., 2025). These results do not only give insight into the cognitive and behavioral processes that initiate and maintain depressive symptoms among PLWH in Botswana but also offer a clear guideline for designing interventions for Botswana. For PLWH in Botswana, CBT-based booklet self-help interventions, which focus on changing maladaptive thoughts, offering relief from physical tension and teach/enhance adaptive coping skills, support the expressed mental health needs. Overall, interventions need to remain culturally and contextually relevant. This study provided the foundation upon which our self-help program and subsequent trial were developed.

The study also outlined the development and implementation of the CBT-based self-help program tailored to the needs of PLWH in Botswana. The program was designed in both Setswana and English to ensure accessibility and cultural relevance. Core components include behavioral activation, cognitive restructuring, relaxation skills, and goal adjustment strategies. While the meta-analysis did not identify relaxation exercises as helpful in treating depressive symptoms, this component was added to our intervention to address the physical tension as expressed by PLWH in Botswana in our baseline study. The other components were selected based on the evidence from the baseline research and meta-analysis conducted as part of this dissertation, which identified them as key mechanisms for reducing depressive symptoms in this population. This finding is in line with previous research (Ciharova, Furukawa, Efthimiou, Karyotaki, Miguel, Noma, Cipriani, & Cuijpers, 2021; Kraaij et al., 2008). We could conclude that the effectiveness of our intervention may have been due to our recognition that ‘one size does not fit all’, and that there was need to design interventions grounded in context, that are responsive to local realities and aligned with the unique mental health needs of PLWH in Botswana.

#### *The significance of coaching*

The coaching in our study seemed important. Both groups received coaching; the intervention group received coaching once a week for a maximum of 15 minutes while the control group (waiting list) received attention only from a coach for a maximum of 5 minutes. We found improvement in depressive symptoms of some participants in the control group. This was also found in previous RCTs that used attention only control conditions (Tong, Ho, Chu, & Mak, 2023). Several participants in the wait-list group reported valuing the weekly calls from the coach and this was captured in the rating of the coach by the participants. It is important to note that the coaching in all conditions of our trial did not include clinical counseling. It appears that just receiving a short call (5 minutes or less) weekly and being listened to may have an effect

on the participants' depressive symptoms even when not yet enrolled in the intervention. This was also suggested by Popp and Schneider (2015). Participants in the intervention group of our RCT similarly seemed to value the coaching as they also rated coaching quite highly. A previous meta-analysis has found that guided interventions showed larger effects than unguided interventions (Leung et al., 2022) and resulted in participants staying longer and completing more exercises during the study (Buelens, Luyten, Claeys, Van Assche, & Van Daelem, 2023). In our study, we could not determine the effect of coaching on the effectiveness of the intervention. We recommend that future studies should explore this relationship further.

#### *The need for routine screening and standard referral procedures*

Routine screening for depressive symptoms is essential for early identification and timely access to care (Siu et al., 2016). Our findings highlighted the need for well-trained staff and sustained collaboration with health facilities, hospital management, and governmental and non-governmental stakeholders to strengthen screening systems, ensure effective referral pathways, and support the implementation of the Botswana's mental health act and national mental health policy. Several implementation challenges were identified and these included funding limitations for materials, training, and private spaces for screening, as well as high staff mobility, time constraints, and the difficulty of integrating screening procedures into already demanding workflows. These findings are similar to those reported in other studies in Botswana (Maphisa, 2019; Molebatsi et al., 2022). Addressing these barriers through continued training, stakeholder involvement, supervision, and consistent provision of educational materials is crucial. Future research should assess sustainability and cost-effectiveness, explore adaptability across settings, and build partnerships with HIV service providers to support countrywide implementation.

#### *The need for an evidence-based implementation plan for sustainability*

To advance from research to implementing interventions in real-world situations, it is critical to apply an evidence-based implementation plan (Klaic et al., 2022). This dissertation highlighted the importance of evidence-based implementation strategies in bridging the gap between evidence and practice. Many barriers hinder the use of research evidence in practice. For instance, in our implementation study (see chapter 6) several barriers were outlined that are common in low-resource countries. In addition, barriers to implementation may include the lack of access by practitioners to the researchers who recommend and publish policies and frameworks for implementation (Akintola, Newbury-Birch, & Kilinc, 2024). Specifically, at times there may be a mismatch between the contexts and language in which researchers and practitioners operate (Akintola, Newbury-Birch, & Kilinc, 2024). While effectiveness is an important step that our research managed to achieve, real-world adoption depends on several factors such as attention to acceptability, feasibility, sustainability, and resource availability. In this study, we explored implementation barriers and strategies and contributed essential insights into how such an intervention could be integrated into routine care. While screening and referral systems are critical to successful implementation, there is need for a coordinated strategy that includes stakeholder engagement and ongoing training and support, as well as structural support. Issues such as workload, patient motivation, creating

privacy for screening, maintaining trained employees for longer in clinics etc. must be addressed for successful implementation.

#### *Implications for Mental Health Care in Botswana*

When considered together, the findings across the studies provided several important contributions to mental health care in Botswana and other LMICs. Firstly, they emphasized the need for scalable, low-cost interventions that can be delivered within existing health infrastructures. Self-help interventions are particularly well suited to settings like Botswana where shortages of mental health professionals remain a major barrier to care. Secondly, the self-help program that we studied was designed based on the lived experiences of PLWH in Botswana which ensured cultural relevance. Interventions developed in high-income countries cannot be assumed to generalize to contexts where cultural beliefs, health-system structures, and stigma dynamics differ substantially (it is not a one-size fits all). Thirdly, the research highlighted the importance of implementation science in bridging the gap between evidence and practice.

#### *Strengths, Limitations, and Future Directions*

A major strength of this dissertation is the use of multiple methodologies, from meta-analysis to cross-sectional survey, intervention development, randomized controlled trial, and implementation strategy design. Using multiple methods shows that our approach was thorough. It helped us confirm our findings from different angles, reduce bias, and gaining a clearer, more complete understanding of the design to implementation process. Furthermore, the intervention was developed using local data and delivered in the local language, increasing its potential acceptability and cultural fit. Another strength of the dissertation is the use of well-validated questionnaires as outcome measures. The questionnaires had very good psychometric properties (PHQ-9, CESD, and GAD-7).

Our meta-analysis is one of the few meta-analyses conducted on self-help interventions in LMICs, making it quite important in providing an evidence base for developing interventions for mental health issues among PLWH and stimulating further research on self-help interventions and their effects on mental health outcomes in LMICs. Moreover, the results of the meta-analysis highlighted the potential for integrating cost-effective self-help interventions into clinical practice by utilizing structures and resources already available, thus reducing the need for extensive human resources. Our second study added to this by providing figures on the prevalence of clinically significant depressive symptoms among both male and female PLWH in Botswana and revealing no gender differences in depressive symptom prevalence suggesting that interventions need to be extended to everyone regardless of gender. The study also assessed the treatment needs and wishes of PLWH in Botswana, as expressed by themselves, as well as the relationships between specific cognitive and behavioral coping strategies and depressive symptoms among PLWH in Botswana, in order to find specific intervention targets. The findings highlighted the value of contextualizing interventions.

The RCT and RCT protocol, which according to our knowledge are the first to be conducted in Botswana, confirmed that the program was able to reduce symptomatology in the short and longer term, providing confidence in the results. The user satisfaction was high which may reflect that the program was

suitable for the target population. We were successful at translating the questionnaires and the self-help program and make it available in English and Setswana with many participants preferring the Setswana version, giving even more strength to the value of localizing interventions to improve chances of intervention success. The program could also be easily translated into other languages for use in other countries. Our study on optimizing implementation gives a helpful strategy to implement the intervention at large scale. It also shows existing opportunities such as utilizing existing structures to offer mental health care in HIV/AIDS clinics.

Several limitations of this study should be acknowledged. The generalizability of findings from the cross-sectional study and RCT may be limited by the demographic composition of the sample, which included a higher proportion of women. Even though the sample reflects the HIV patterns seen in Botswana, the fact that men and women experience similar levels of depressive symptoms shows that future studies should include more men. This will help researchers learn whether men may face different challenges when seeking mental health care. Another limitation of the cross-sectional study is that the design did not allow for causal inferences to be made regarding the treatment targets. Future studies would benefit from adopting a longitudinal approach to better assess directional and causal relationships. In addition, this study relied solely on self-report instruments, which may have introduced social desirability effects, particularly considering the sensitive nature of HIV-related topics. Subsequent research should incorporate clinician-administered interviews and observational methods to provide a more comprehensive assessment.

Our meta-analysis had some limitations including publication bias which suggested that studies with smaller effect sizes were not included in the analysis, limiting the generalizability of our study. We also only included studies published in English, only RCTs, potentially excluding studies published in other languages in LMICs and other formats. This limits comparison with other study designs.

There were several other limitations from the RCT. Participant inclusion was determined using screening scores, whereas the analyses relied on pre-test scores. Because some time elapsed between these assessments, discrepancies may have arisen. Future research should aim to minimize the interval between screening and study enrolment. Another limitation is that depressive symptoms were assessed exclusively through self-report. Although this was partly mitigated by using well-validated, widely applied instruments with established cut-off values, our study would have benefited from clinical interviews to confirm diagnoses. Additionally, while a formal diagnosis of depression was not required for inclusion and interviews were not feasible due to time constraints, incorporating diagnostic assessments would undoubtedly have strengthened the findings.

The RCT small sample size also limits the generalizability of our results to the broader population of PLWH in Botswana or other sub-Saharan African settings. Differences in employment status between study conditions also represent a possible confounding variable, given the well-documented relationship between employment and depressive symptoms. A further limitation concerns the statistical power of the RCT, which was reduced due to the high attrition rate and the need for data imputation. These factors may have weakened the study's ability to detect true effects of the intervention. High attrition, while a common

challenge in self-help interventions, may limit the strength of RCT outcomes. Because the study was neither designed nor sufficiently powered to detect effects in prediction, moderation, or mediation models, it was not possible to draw firm conclusions about the mechanisms of change or for whom the intervention works best. Furthermore, the study did not include a systematic evaluation of treatment integrity, which limits our ability to determine whether the intervention was delivered consistently and as intended.

In addition, the brief follow-up period may have restricted our ability to evaluate long-term outcomes, potentially leading to an underestimation of both the intervention's sustained benefits and any delayed adverse effects. Future research should examine long-term outcomes. The use of bachelor-level psychology coaches may further limit external validity, as some treatment settings may lack staff with similar qualifications, which could hinder uptake or scalability.

While booklet-based interventions were preferred and effective during our RCT, expanding the intervention to digital options may become increasingly relevant as mobile connectivity improves in Botswana or for different sections of the Botswana population that is living with HIV. Future research should investigate the effectiveness of online programs in treating depressive symptoms because the meta-analysis showed that online programs were as effective as booklet interventions. In addition, investigating the cost-effectiveness of the intervention is also recommended in a larger sample. Resource limited countries like Botswana can benefit from such research to ensure that limited funds are used efficiently and that the intervention remains feasible over time. Furthermore, as far as we know, none of the HIV treatment centers in Botswana screen for any mental health problems, leaving those who have mental health issues possibly undetected and untreated. We recommend the design and implementation of a short screening tool for prevalent mental health problems such as depressive and anxiety symptoms among PLWH in Botswana. Early detection is critical as it means the patients can be referred into the program and receive the treatment they need.

A central limitation of the implementation study is in the use of a reflexive methodology, which by nature involves a high degree of subjectivity because the analysis is shaped by the researchers' own perspectives and interpretive lenses. Future investigations may benefit from incorporating alternative methodological approaches or hybrid effectiveness-implementation designs (Curran, Bauer, Mittman, Pyne, & Stetler, 2012), which would allow for simultaneous assessment of both intervention outcomes and implementation processes. Moreover, mixed methods studies that combine quantitative measures with qualitative insights from patients, providers, and other stakeholders could yield a more comprehensive understanding of implementation challenges, facilitators, and user experiences.

## **Conclusion**

This dissertation provides a comprehensive examination of a CBT-based self-help intervention for depressive symptoms among PLWH in Botswana, addressing a critical gap in accessible mental health care in LMICs. The findings of the five studies presented demonstrate that self-help interventions are effective, acceptable, culturally relevant, and feasible to implement when grounded in the mental health needs of local people and supported by evidence-based implementation strategies. By advancing knowledge on both

the development and integration of scalable mental health interventions, this work contributes meaningfully to ongoing efforts to reduce the global burden of depression and support the psychological well-being of people living with HIV in low-resource countries.

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## Chapter 8

English summary

Dutch summary

Curriculum Vitae

Publications

Acknowledgements



## Summary

**Introduction:** Despite the severe impact, depressive symptoms among people living with HIV (PLWH) often remain underdiagnosed and undertreated, particularly in resource-limited settings where mental health services are scarce or inaccessible. Addressing depressive symptoms in PLWH is therefore a critical component of comprehensive HIV care. Traditional models of mental health treatment, relying on specialized clinical services, face numerous barriers in low- and middle-income countries (LMICs) where the majority of PLWH reside. Self-help interventions, particularly those based on Cognitive Behavioral Therapy (CBT), have emerged as promising tools for managing depressive symptoms in various populations, including PLWH.

**Objectives:** The overarching aim of this doctoral research is to advance the understanding and development of scalable, effective self-help interventions for depressive symptoms among PLWH in Botswana. Specifically, the objectives of this dissertation were to; 1) conduct a systematic review of existing interventions to treat depressive symptoms in LMICs; 2) explore correlates and risk factors for depressive symptoms among PLWH, in order to find intervention targets for depressive symptoms among PLWH in Botswana. We also explored the mental health needs for PLWH in Botswana and conducted a feasibility assessment for a self-help intervention; 3) to adapt a CBT-based self-help intervention to reduce depressive symptoms among PLWH in Botswana; 4) to empirically evaluate the effectiveness of the CBT-based self-help intervention; and 5) to examine implementation challenges and facilitators of our interventions as well as to present an evidence-based implementation strategy for the booklet self-help intervention.

**Method:** This research utilized various research designs and methods. For the review, we searched for journal articles from various databases. We looked at the overall results to find out if self-help programs helped to reduce depressive symptoms in PLWH better than control conditions in LMICs. We also conducted a survey with 291 people receiving HIV care in Botswana to understand levels of depressive symptoms, coping skills and mental health care needs. Next, we designed a self-help program and then conducted a structured study where some participants received and followed a booklet self-help program with coaching, while others were on the waiting list. Their depressive symptom scores were

compared over time to see if the program worked. Participants were assessed before, after and three months after the program. Finally, the study examined practical challenges in delivering the program and developed strategies to improve its implementation in the real world.

**Results:** In the review, 18 studies were included. Self-help interventions were found to be effective in reducing depressive symptoms. These interventions were even more effective when studies were conducted in countries at the lower side of income, had at least mild depression as inclusion criterion, reported less than 30% drop-out rate, did not use relaxation techniques, had a low or medium risk of bias, and used a booklet or online form of intervention.

Findings from the survey showed that a total of 43.4% participants reported clinically significant depressive symptoms. The majority of participants indicated that they needed help with the following topics: feelings of depression, physical tension, finding new goals and coping with HIV. In addition, they indicated preferring a self-help programme in booklet format. Multiple regression analyses showed that the following coping strategies had significant relationships with depressive symptoms: rumination, catastrophising, withdrawal, positive refocusing and refocus on planning.

We found significantly larger decreases in both depressive and anxiety symptoms in the group that followed the intervention than in the wait-list group. Most people were happy with the intervention. Barriers encountered during implementation included costs, lack of screening, lack of trained professionals, etc., with the most important and changeable barrier being the lack of screening and referral into the self-help program. The most important implementation strategies include good collaboration with stakeholders and training of staff and coaches.

**Conclusion:** The findings of this project could inform the design and implementation of mental health interventions that could prevent or treat depression. Implementing this low-cost and scalable self-help program in a LMIC such as Botswana is critical in bridging the existing mental health treatment gap. It is important to recognise that standard screening for depressive symptoms is critical to accessing the intervention. The findings suggest that an intervention for PLWH with depressive symptoms in Botswana should preferably be a self-help program presented in booklet format. With regard to content, the

results confirmed that the intervention should focus on specific coping skills. In addition, elements like goal finding and strategies to reduce physical tension should be added.

**Recommendations:** While booklet-based interventions were preferred and effective during our study, expanding the intervention to digital options may become increasingly relevant as mobile connectivity improves in Botswana or for different sections of the Botswana population that is living with HIV. Future research should investigate the effectiveness of online programs in treating depressive symptoms because the review showed that online programs were as effective as booklet interventions. In addition, investigating the cost-effectiveness of the intervention is also recommended in a larger sample. Resource limited countries like Botswana can benefit from such research to ensure that limited funds are used efficiently and that the intervention remains feasible over time. Furthermore, as far as we know, none of the HIV treatment centres in Botswana screen for any mental health problems, leaving those who have mental health issues possibly undetected and untreated. We recommend the design and implementation of a short screening tool for prevalent mental health problems such as depressive and anxiety symptoms among PLWH in Botswana. Early detection is critical as it means the patients can be referred into the program and receive the treatment they need. Future investigations may benefit from incorporating alternative research designs which would allow for simultaneous assessment of both intervention outcomes and implementation processes. Moreover, mixed methods studies that combine quantitative measures with qualitative insights from patients, providers, and other stakeholders could yield a more comprehensive understanding of implementation challenges, facilitators, and user experiences.

## **Samenvatting (Nederlands)**

**Inleiding:** Ondanks de grote impact worden depressieve klachten bij mensen met hiv vaak niet herkend en/of behandeld, vooral op plekken waar de middelen beperkt zijn en waar de geestelijke gezondheidszorg schaars of moeilijk toegankelijk is. Aandacht voor depressieve symptomen bij mensen met hiv zou een essentieel onderdeel van de integrale hiv-zorg moeten zijn. Vooral lage- en middeninkomenslanden (LMIC's) ondervinden talrijke belemmeringen hierbij, omdat er vaak nog gewerkt wordt vanuit traditionele behandelingsmodellen. Zelfhulpinterventies, met name als deze gebaseerd zijn op cognitieve gedragstherapie (CGT), zijn naar voren gekomen als een veelbelovende aanpak voor depressieve klachten in verschillende populaties, waaronder mensen met hiv.

**Doelstellingen:** Het overkoepelende doel van dit promotieonderzoek is het vergroten van het inzicht in en het ontwikkelen van schaalbare en effectieve zelfhulpinterventies voor mensen met hiv en depressieve symptomen in Botswana. Specifiek richtte het proefschrift zich op: 1) het uitvoeren van een systematische review over de effecten van bestaande zelfhulpinterventies voor depressieve symptomen in LMIC's; 2) het onderzoeken van verbanden met en risicofactoren voor depressieve klachten bij mensen met hiv in Botswana, met als doel het vinden van aangrijpingspunten voor interventies, als ook het verkennen van de mentale gezondheidsbehoeften en de haalbaarheid van een zelfhulpinterventie; 3) het aanpassen van een bestaande op CGT gebaseerde zelfhulpinterventie voor het verminderen van depressieve symptomen bij mensen met hiv in Botswana; 4) het met empirisch onderzoek evalueren van de effectiviteit van deze op CGT gebaseerde zelfhulpinterventie; 5) het onderzoeken van uitdagingen en mogelijkheden voor het ontwikkelen van een empirisch onderbouwde implementatiestrategie voor de interventie.

**Methode:** In dit onderzoek zijn diverse onderzoeksdesigns en methoden gebruikt. Voor de review werden artikelen verzameld met behulp van verschillende databases en werd onderzocht of zelfhulpinterventies effectiever waren bij de behandeling van depressieve klachten bij mensen met hiv in LMIC's vergeleken met controlecondities. Daarnaast werd een survey uitgevoerd onder 291 mensen die hiv-zorg ontvingen in Botswana, om inzicht te krijgen in depressieve symptomen, coping vaardigheden en behoeften aan mentale

zorg. Vervolgens werd een zelfhulpprogramma ontwikkeld en getest in een gerandomiseerde studie waarbij een deel van de deelnemers een zelfhulpboek met coaching ontving (interventiegroep), terwijl anderen op de wachtlijst stonden. Depressiescores werden met elkaar vergeleken voor, na en drie maanden na de interventie. Tot slot werden praktische uitdagingen bij het verder in praktijk brengen van het programma onderzocht en strategieën ontwikkeld om een goede implementatie te bevorderen.

**Resultaten:** In de review werden 18 studies opgenomen. Zelfhulpinterventies bleken effectief in het verminderen van depressieve symptomen. Ze waren het meest effectief wanneer het onderzoek plaatsvond in de landen met de laagste inkomens, wanneer milde depressiesymptomen als minimaal inclusiecriteria werden gebruikt, wanneer de drop-out onder de 30% bleef, wanneer er geen ontspanningstechnieken werden toegepast, wanneer het risico op bias laag of gemiddeld was, en wanneer de interventie gebruik maakte van een boekje of van een online format.

Uit de survey bleek dat 43.4% van de deelnemers klinisch significante symptomen van depressie rapporteerde. De meerderheid gaf aan hulp nodig te hebben bij: depressieve gevoelens, fysieke spanning, het vinden van nieuwe doelen en het omgaan met HIV. Deelnemers gaven de voorkeur aan een zelfhulpprogramma in de vorm van een boek. Multiple regressieanalyses lieten zien dat de volgende copingstrategieën significant samenhangen met depressieve klachten: rumineren, catastroferen, terugtrekgedrag, je positief heroriënteren en je richten op plannen.

We vonden significant grotere afnames in zowel depressieve als angstklachten in de interventiegroep vergeleken met de wachtlijstgroep. De meeste deelnemers waren tevreden met de interventie. Geobserveerde obstakels met betrekking tot implementatie van het programma waren onder andere kosten, gebrek aan screening, en gebrek aan getraind personeel. De meest belangrijke barrière voor succesvolle implementatie die werd aangetroffen, was het ontbreken van screening op psychische klachten en gerichte doorverwijzing naar het zelfhulpprogramma. Belangrijke implementatie-bevorderende strategieën die werden gevonden, waren een goede samenwerking met stakeholders en training van personeel en coaches.

**Conclusie:** De bevindingen van dit project kunnen bijdragen aan de ontwikkeling en implementatie van mentale gezondheidsinterventies ter preventie of behandeling van depressieve klachten. Het invoeren van een laagdrempelig en schaalbaar zelfhulpprogramma in een LMIC zoals Botswana is essentieel om de bestaande kloof in de geestelijke gezondheidszorg te verkleinen. Standaard screening op depressieve symptomen is van cruciaal belang om toegang tot de interventie te waarborgen. De resultaten suggereren dat een interventie voor mensen met hiv in Botswana bij voorkeur een zelfhulpprogramma in boekvorm zou moeten zijn. Wat de inhoud betreft, blijkt dat de interventie zich moet richten op specifieke coping vaardigheden, aangevuld met elementen zoals het vinden van doelen en strategieën om fysieke spanning te verminderen.

**Aanbevelingen:** Hoewel interventies in boekvorm in dit onderzoek effectief waren en er een voorkeur voor was uitgesproken, kan uitbreiding naar digitale opties steeds relevanter worden naarmate de mobiele connectiviteit verbetert in Botswana, of voor specifieke groepen mensen met hiv. Verder onderzoek zou gedaan moeten worden naar de effectiviteit van online programma's, aangezien de review aantoonde dat deze net zo effectief kunnen zijn als interventies in boekvorm. Ook wordt aanbevolen om de kosteneffectiviteit van de interventie te onderzoeken, in een grotere steekproef, om efficiënt gebruik van beperkte middelen te garanderen. Op dit moment wordt, voor zover bekend, in geen van de HIV-behandelcentra in Botswana gescreend op mentale gezondheidsproblemen, waardoor veel mensen met klachten onopgemerkt blijven. We bevelen de ontwikkeling en implementatie aan van een korte screeningsmethode voor veelvoorkomende mentale problemen, zoals depressie en angstklachten. Vroege detectie maakt doorverwijzing en behandeling mogelijk. Een aanbeveling voor toekomstig onderzoek is om gebruik te maken van alternatieve onderzoeksopzetten waarbij effectiviteit van de interventie en implementatieprocessen gelijktijdig worden gemeten. Daarnaast kunnen mixed-methods studies—waarin kwantitatieve data worden gecombineerd met kwalitatieve inzichten van patiënten, zorgverleners en andere betrokkenen—een vollediger beeld geven van implementatie-uitdagingen, bevorderende factoren en gebruikerservaringen.

### **Curriculum Vitae**

Boitumelo Vavani was born on December 26, 1984. She completed high school at Tutume McConnel College in Botswana and later completed her Bachelor of Psychology degree in 2007 at the University of Botswana. After her bachelor's degree, she worked for two years as a staff development fellow at the University of Botswana, Psychology Department. She received her Master of Arts in Clinical Psychology from the University of Witwatersrand, Johannesburg, South Africa in 2012. Her Master's thesis aimed to explore black South African women's experiences of and opinions about motherhood and attachment. Since 2012 she has worked as a lecturer at the University of Botswana. Her work at the University involves teaching, research, and administrative duties. In 2014, Boitumelo started her PhD project at the Department of Clinical Psychology at Leiden University focusing on designing and evaluating a self-help intervention for people living with HIV and depressive symptoms in Botswana. Boitumelo also works as a clinical psychologist and serves as a clinical supervisor to interns at the University of Botswana psychology clinic. She continues to teach several undergraduate psychology courses at the University of Botswana. Boitumelo also works part time in a psychology clinic where she is responsible for providing psychotherapy to aid positive behavioural changes to individual clients and to the community at large. In addition, she is responsible for conducting psychological assessments for clients and learners with behavioural and learning disorders.

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**Vavani, B.**, Garnefski, N., Spinhoven, P., Amone-P'Olak, K., Teseletso, T., & Kraaij, V. (2025). Optimizing implementation of an evidence-based self-help intervention program for people living with HIV (PLWH) with depressive symptoms in Botswana. *AIDS Care*, 37(12), 2053–2062. <https://doi.org/10.1080/09540121.2025.2565425>

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