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Full Length Research Paper

Development of a contextualised physical activity programme to improve health outcomes among people living with HIV-related disability in Nigeria: A study protocol

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Transitioning from a life-threatening infection resulting in acute illness to a long-term manageable condition implies that HIV management requires collaboration between primary care clinicians and rehabilitation teams. Recognized as an effective, safe, and beneficial health strategy, physical activity has been recommended in HIV management. However, despite its numerous benefits, there remains a low prevalence of physical activity in sub-Saharan Africa. It has been reported that individuals living with HIV-related disability often do not engage in sufficient physical activity. This study aims to explore the extent and nature of HIV-related disability in Nigeria, its impact on quality of life, and how certain factors may influence participation in physical activity. The goal is to develop a context-specific physical activity program to address rehabilitation needs. Employing a mixed-methods approach in three phases, the study will conduct a cross-sectional survey, one-on-one interviews, and a scoping review in the first phase. Data from phase one will be integrated using a clinical reasoning approach. The second phase involves a modified Delphi study to evaluate the developed physical activity program, while the third phase assesses program feasibility. The study population includes individuals aged 18 and above living with HIV/AIDS in Lagos State, Nigeria. The findings will contribute valuable insights into the extent of HIV-related disability, its impact, and the factors influencing physical activity engagement, ultimately informing the development of effective rehabilitation interventions.

Key words: HIV, disability, physical activity.

INTRODUCTION

In 2022, it was estimated that approximately 67.5% of the approximately 37.9 million people living with HIV globally are located in Africa (UNAIDS, 2023). Consequently, the implications of HIV-related disabilities hold particular significance in sub-Saharan Africa (Banks et al., 2015). Despite a low prevalence of 1.4%, Nigeria has the second-largest HIV epidemic globally, with 1.9 million people living with HIV in the country (UNAIDS, 2023). Olaleye et al. (2017) reported that among the 360 participants living with HIV in a study conducted in Ibadan, more than two-thirds experienced mild to extreme disabilities. However, the impact of HIV on

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disability in Nigeria has not been extensively researched, and there is a dearth of literature on the prevalence of HIV-related disability and the rehabilitation strategies currently being implemented in its management (Olaleye et al., 2017).

Disability is a multifaceted phenomenon that manifests at three levels: the corporal (body), person, and social level, encompassing long-term physical, mental, and intellectual impairments that impede individuals from effectively participating in society (Palmer and Harley, 2012). Disability may arise due to the progression of HIV infection and side effects of highly active antiretroviral therapy (HAART) drugs. Both HIV and HAART have been reported to adversely affect overall health, impacting the immune system (Zicari et al., 2019), cardiovascular system (So-Armah et al., 2020), central nervous system (Spudich and Clements, 2019), and musculoskeletal system (Walker-Bone et al., 2017). These compromised body systems make individuals prone to fatigue, joint pain, hypertension, dyslipidemia, neuropathy, depression, opportunistic infections such as pneumonia, and non-communicable diseases such as kidney disease, cardiovascular disease, and diabetes (Ibeneme et al., 2019; Achwoka et al., 2020; Gabuzda et al., 2020). These symptoms contribute to poor Health-Related Quality of Life (HRQoL) in people living with HIV (Seguiti et al., 2022), posing a significant global health challenge. Public health services encompass prevention or treatment of impairments and provision of rehabilitation services (Bright et al., 2018). To enhance patients' health and promote healthy living, physical activity, a non-pharmacological alternative, has been recommended by health providers as a strategy to mitigate the risk of developing disabilities among people living with HIV (PLWH) (Dang et al., 2018). Studies have shown that physical activity enhances functional capacity, muscle strength, joint flexibility, and endurance among PLWH (Voigt et al., 2018; Ibeneme et al., 2019; Martin et al., 2019; Enichen et al., 2022). A systematic review by O'Brien et al. (2016) reported positive cardiorespiratory, strength, and body composition outcomes resulting from physical interventions among PLWH. Furthermore, functional issues such as difficulty in walking, impairments, and disabilities among PLWH can be ameliorated through participation in home-based and community-based rehabilitation programs (Cobbing et al., 2017a).

Despite the recognized health benefits of physical activity, evidence suggests that individuals living with HIV often do not engage in sufficient physical activity (Vancampfort et al., 2018). Various barriers may contribute to this low participation, particularly in Africa, where cultural, environmental, and socioeconomic factors play significant roles (Mabweazara et al., 2018). Stigma and discrimination are prevalent barriers to HIV therapy and prevention in Africa, including Nigeria (Tesfay et al., 2020). For instance, individuals living with HIV in Nigeria may experience stigma if their status becomes public knowledge, facing the dual burden of living with HIV and enduring community stigmatization (Saeed and Ayuwat, 2020; Ogunyemi et al., 2022). Perceived stigmatization may subsequently impact their motivation to engage in physical activity, as evidenced by a cross-sectional study conducted in Uganda linking higher internalized HIV-related stigma to lower levels of physical activity (Kalichman et al., 2020).

Presently, public health physical activity recommendations in Nigeria focus on utilizing community or home-based rehabilitation methods to enhance health outcomes among people living with HIV (Cobbing et al., 2017b; Mabweazara et al., 2019). Social determinants of health, such as the opportunity cost of exercise engagement, individuals' socioeconomic status, and susceptibility to stigma, have been identified as influential factors in understanding physical activity participation among people living with HIV in Nigeria (Safa et al., 2022). Thus, the aim of this study, conducted over three phases, is to determine the pattern and prevalence of disabilities among people living with HIV in Nigeria and develops a context-specific physical activity program to address these disabilities.

MATERIALS AND METHODS

Table 1 provides a summary of the methodology for the study across three phases, outlining the study design and procedures. This study adopts a mixed-methods approach with five studies conducted. In phase one, study one is a cross-sectional study utilizing questionnaires to determine the pattern and prevalence of disabilities among people living with HIV in Nigeria, as well as their health-related quality of life and physical activity levels. Study two of phase one is a qualitative study aiming to explore the experiences of disability among PLWH and investigate their perceived barriers and facilitators to physical activity participation, utilizing one-on-one interviews. Study three of phase one involves conducting a scoping review of evidence to identify the range of implementation strategies in the rehabilitation of HIV-related disability.

For the second phase of the study, data from studies one to three will be triangulated through direct content analysis to develop a context-sensitive exercise program for people living with HIV-related disability. This program will be validated by experts in study four, which is a Delphi study. The third phase of the study is a feasibility study aimed at testing the feasibility and acceptability of the developed physical activity program. Figure 1 shows the sequential process for the development of physical activity intervention programme.

Instruments

Study one: the following self-administered questionnaires will be used for data collection: Socio-demographic questionnaire, Medical Symptoms Questionnaire (MSQ), World Health Organization Disability Assessment Schedule 2.0 (WHODAS), Medical Outcomes Survey (MOS)-HIV Instrument and the International Physical Activity Questionnaire (IPAQ).

Questionnaire: The sociodemographic questionnaire shall provide information on the age, gender, marital status, educational qualifications, and income range of the participants.

Table 1. Summary of the study.

Section	Phase one			Phase two	Phase three
	Study one	**Study two**	**Study three**	**Study four**	**Study five**
Objectives	To determine the pattern and prevalence of disabilities among people living with HIV in Nigeria	To determine the barriers and facilitators of physical activity participation among PLWH in Nigeria	To identify the various implementation strategies adopted in the rehabilitation of disability experienced by PLWH	To develop the exercise-based intervention program	To test the feasibility and acceptability of the developed exercise program
Data needed	The pattern of disability, symptoms, physical activity level, health status	Experiences on factors influencing physical activity participation	Rehabilitation programs for people living with HIV-related disability	Triangulated results from phase one to three	Pre- and post-test feasibility study
Study design	Cross-sectional study	Qualitative study	Scoping study	Modified Delphi study.	Qualitative study
Location	HIV/AIDS Testing and Treatment Centres in Lagos	HIV/AIDS Testing and Treatment Centres in Lagos	Virtual	Virtual	HIV/AIDS Testing and Treatment Centres in Lagos
Source of data	Medical Symptoms Questionnaire (MSQ), World Health Organization Disability Assessment Schedule 2.0 (WHODAS), Medical Outcomes Survey (MOS)-HIV Instrument and the International Physical Activity Questionnaire (IPAQ)	One-on-one interview	Relevant data (published and unpublished). All study designs	Expert panel	One-on-one interview
Sample size	384 participants	Minimum of 15 participants	No limit on number of studies to be included	Minimum of 30 participants	Minimum of 15 participants
Inclusion criteria	Participants must be adults (18 years and above) and must have commenced ART at least six months before the commencement of the study.	Participants must be adults (18 years and above) and must have commenced ART at least six months before the commencement of the study.	Population: studies that include people living with HIV, who are 18 years and over. Concept: Different implementation strategies in the management of HIV-related disability, rehabilitation strategies include physical activity or exercise therapy. Context: studies on implementation strategies for rehabilitation of disability among PLWH conducted in a clinical (hospital and primary health care facility), home, or community-based setting.	Participants need to meet at least one of the following requirements: stakeholder in clinical decision-making role, experts who work closely for and with people living with HIV, affiliation to HIV/AIDS clinic, membership in physical activity organizations, government entities or universities.	Participants must be adults (18 years and above) living with HIV and attending HIV/AIDS testing and treatment centres in Lagosa
Procedure and instrumentation	Questionnaires will be used to collect information on the demographic data, medical symptoms experienced, the pattern of HIV-related disability, health-related quality of life and physical activity level.	People living with HIV will be interviewed to explore their experiences of disability, strategies used to manage the HIV-related disability, and investigate their perceived barriers and facilitators to physical activity participation. The interviews will be audio-recorded and transcribed verbatim.	The Joanna Briggs Institute Reviewers Manual 2020: Methodology for JBI Scoping reviews will be adopted	The Delphi study will be used to obtain consensus among purposively sampled experts in the field of physical activity, HIV, rehabilitation, and implementation.	People living with HIV will be interviewed to seek their opinion on the potential usefulness of the developed physical activity program. The interviews will be audio-recorded and transcribed verbatim.

Table 1. Contd.

Data analysis	Descriptive statistics of mean, standard deviation, and frequency. Inferential statistics	Thematic content analysis will be used to identify themes from the qualitative data. The data will be analysed and managed using MAXQDA software	A narrative review of the number of studies found that addressed the research topic, study designs, and the variety of secondary health condition prevention strategies	Data from the online questionnaire will be exported to Microsoft Excel for descriptive analysis (frequencies and percentages). Answers to open-ended questions will be coded through a content analysis approach. Based on the feedback and analysed results, the final output for each round shall be compiled.	Demographic characteristics of the participants will be described using descriptive statistics. Thematic content analysis will be used to identify themes from the qualitative data. The data will be analysed and managed using MAXQDA software
Outcome	Physical activity level and perceived health status would provide information on the causative relationship between their current health state and their rehabilitation needs.	Understanding the factors associated with physical activity participation would be used to design a need-based rehabilitation programme.	Data from this phase will identify and provide knowledge on the research gaps that exist in the literature regarding the implementation of rehabilitation strategies in the management of HIV-related disability	Consensus agreement on the developed context-sensitive physical activity program for PLWH	The feasibility and acceptability of the intervention programme will be understood

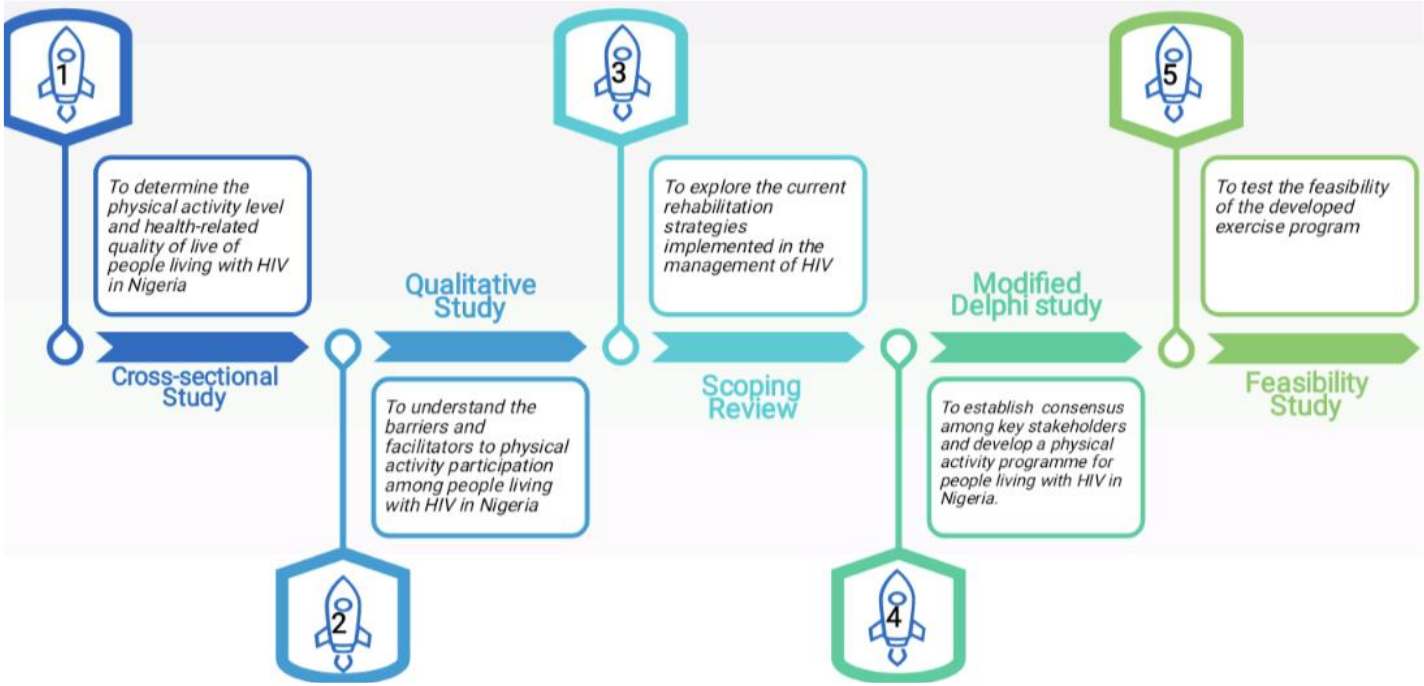

Figure 1. Sequential process for the development of physical activity intervention programme.

Medical Symptoms Questionnaire (MSQ): Shall be modified from the Medical Symptoms Questionnaire compiled by the Institute for Functional Medicine (2020). It identifies symptoms that help diagnose underlying illness and tracks progress over time. Each symptom is based on the health profile of the patient over the previous three months. The scoring system is organized into 15 symptom-specific domains covering the head, eyes, ears, nose, mouth/throat, skin, heart, lungs, digestive tract, joints/muscles, weight, energy/activity, mind, emotions, and others. Respondents are required to assign a score ranging from 0 to 14 for 71 symptoms observed over the previous 14 days. A score of 0 means never having experienced such symptoms; 1 to 2 means occasional symptoms, not severe ("1") or severe ("2") effects; 3 and 4 mean frequent symptoms and not severe ("3") or severe ("4") effects. Therefore, a lower score means a lower symptom burden (Institute for Functional Medicine, 2020).

WHO Disability Assessment Schedule (WHODAS 2.0): Shall be used to assess functioning and disability in various core activities essential in daily life. The 12-item version is used for a brief assessment of overall functioning and asks questions about six domains: cognition (learning, concentrating), mobility (standing, walking), self-care (washing, dressing), getting along (keeping friendships, dealing with people), life activities (work/school), and participation (joining community activities, emotional effects). The scores, considering the various levels of disability for each item in the questionnaire, will be determined using the "item-response-theory". They will subsequently be summarized and converted into a metric ranging from 0 to 100 for each domain. The average scores are comparable to the WHODAS five-point scale, which allows the clinician to assess the individual's disability in terms of none (0-0.49), mild (0.5 to 1.49), moderate (1.5-2.49), severe (2.5-3.49), or extreme (3.5-4) (Üstün et al., 2010). The tool has been validated and demonstrated to be effective for screening functionality and disability among PLWH (Barbosa, 2018). Furthermore, the internal reliability of the entire WHODAS 2.0 using Cronbach α is 0.89 (Holmberg et al., 2021).

HIV Medical Outcomes Survey (MOS-HIV)*:* Shall be used to measure health-related quality of life among the participants. It is a 35-item questionnaire that assesses 10 dimensions of health, including general health perceptions, pain, physical functioning, role functioning, social functioning, mental health, energy/fatigue, cognitive function, and quality of life. The Cronbach's α coefficient is > 0.7 for group comparisons, indicating adequate reliability. Wu et al. (1997) also reported the validity of the physical and mental health summary scores of the MOS-HIV. The scoring of this scale involved a two-step process. First, numerical values will be re-coded, and then each item scored from 0 to 100, with a high score indicating good health. To estimate the 10 domains of patient functioning, items from the same scale will be averaged.

The International Physical Activity Questionnaire (IPAQ-SF)*:* This is a self-reported measurement tool for physical activity suitable for assessing physical activity and inactivity in a population (Stelmach, 2018). The IPAQ-SF measures the physical activity levels of people aged 15 to 69 years and was adapted from the long form IPAQ, which assesses activity levels across five domains (job-related, transportation, housework, recreation, and time spent sitting), contains four generic items, and can be self-administered or administered via the telephone (Craig et al., 2017). The questionnaire requires information on the time spent on physical activities over the past seven days and has acceptable measurement properties for developed and developing nations. It has been previously used in the Nigerian population, where the overall PA (ICC = 0.79, 95 % CI 0.65 to 0.82) showed moderate test-retest reliability (ICC > 75, intraclass correlation coefficient) (Oyeyemi et al., 2014). The IPAQ-SF measures three specific types of activity: walking; moderate physically intense activity; and vigorous physically intense activity (Craig et al., 2017).

The IPAQ scoring protocol will be used to report the collected data in terms of categorical and continuous measures (Cleland et al., 2018). For continuous data, one measure of the volume of activity will be computed by weighting each type of activity in terms of its energy requirements, as defined in METs. Thus, walking = 3.3 METs; moderate physical activity = 4.0 METs; and vigorous physical activity = 8.0 METs.

Study two: A qualitative research method shall be adopted to achieve the objectives of this study which were to determine the barriers to and facilitators of physical activity participation among PLWH. The qualitative research method is now commonly used in HIV/AIDS research as it is essential to providing insights into the socio-behavioural elements of HIV (Doyal, 2014; Syed et al., 2014). In the methodology, the HBM (Yen and Li, 2019) will be considered in understanding the barriers to and facilitators of physical activity among PLWH.

The interviews will be conducted by the principal investigator in English language. The interviews will be conducted using a Philips DVT digital dictaphone, and the recordings saved in MP3 format. In addition to the audio recordings, the interviewer shall write additional notes, with reflective comments also being added at appropriate times during the interviews. The duration of each interview shall be between 30 and 45 min.

Study three: A scoping review shall be conducted to achieve the objectives of this study. A comprehensive literature search shall be conducted to identify studies that report on the methodology of physical activity intervention programs for PLWH. PubMed, Web of Science, and EBSCO databases will be searched for publications from January 2003 (when ART became increasingly available and accessible to PLWH in sub-Saharan Africa) using the keywords: HIV, exercise, physical activity, rehabilitation/therapy, physiotherapy, and home-based, community-based, clinic-based. The following terms will be included in the given combination to create relevant search strings for the review:

1) Condition-related terms: HIV, human immunodeficiency virus, HIV/AIDS
2) Intervention-related terms: physical activity, exercise, aerobic, resistance, strengthening, physiotherapy, physical therapy, flexibility, balance, rehabilitation, and therapy.
3) Guideline-related terms: intervention, reach, effectiveness, adoption, implementation, maintenance, compliance, adherence, and uptake.

Identified records will be exported to EndNote software for de-duplication and then Microsoft Excel Spread sheet for screening. After duplicates are removed, titles and abstracts will be screened against the inclusion criteria by two independent reviewers. Studies that meet the inclusion criteria will be retrieved and assessed against the review's eligibility criteria.

Study four: This shall commence the second phase of the study. Findings from studies one to three will be synthesized using a methodological triangulation approach. From the results, contents of a contextualized physical activity program will be developed. A consensus-based strategy shall be used, based on a modified Delphi procedure. The Delphi study shall be conducted online to address the barrier of logistics challenges posed by physical meetings.

Study five: Semi-structured interviews will be used to assess the feasibility of the implementation of the developed physical activity program by exploring the opinion of PLWH on its usability, facilitators, barriers, and other issues they might envisage in implementing the physical activity program in their context.

Sample size and inclusion/exclusion criteria

For the first study, the sample size was calculated using the sample size formula for an unknown population in a prevalence study (Naing et al., 2022).

$$\boldsymbol{n} = [\boldsymbol{NZ}^2\mathrm{P}(1-\mathrm{P})] \div [\mathrm{d}^2(\mathrm{N}-1) + \mathrm{Z}^2\mathrm{P}(1-\mathrm{P})]$$

An estimated sample size of 384 participants would be deemed sufficient to minimize Type 1 and 2 errors in this study, considering a margin of error of 0.05 at a 95% confidence interval and an estimated prevalence of disability of 51.9% (Myezwa et al., 2018). The inclusion criteria for studies one and two will encompass adults living with HIV/AIDS (18 years and above) who have initiated ART at least six months prior to the study's commencement. For study two, a minimum of 15 one-on-one interviews will be conducted with individuals living with HIV-related disability, with data collection continuing until saturation is achieved. Regarding study three, there will be no set limit on the number of studies to be included in the review. Studies of any design conducted in any setting (such as home-based, clinic-based, or community-based) with a clearly defined structure will be selected. The inclusion criteria for the scoping review will be guided by the population, concepts, and context (PCC) approach:

Population

This review will consider studies that include people living with HIV, who are 18 years and over.

Concept

Different implementation strategies in the management of HIV-related disability, rehabilitation strategies include physical activity or exercise therapy.

Context

The review will consider studies on implementation strategies for rehabilitation of disability among PLWH conducted in a clinical (hospital and primary health care facility), home, or community-based setting.

For study four, to provide rigour for statistical analysis, a minimum number of 30 experts will be included in the Delphi study. The inclusion criteria for the Delphi study shall be participants who meet at least one of the following requirements: stakeholder in clinical decision-making role, experts who work closely for and with people living with HIV, affiliation to HIV/AIDS clinic, membership in physical activity organizations, government entities or universities. For study five, a purposive sampling of minimum of 15 PLWH attending HIV/AIDS testing and treatment centres in Lagos will be invited to participate in the study.

Data analysis

Data from the questionnaires in study one will be analyzed using the Statistical Package for the Social Sciences (SPSS) version 22, with significance set at a p-value of ≤ 0.05. Descriptive statistics including mean, standard deviation, and frequency will be utilized to analyze demographic characteristics and health outcomes. Inferential statistics will be employed as appropriate to determine the relationship between the dependent and independent variables. Thematic content analysis will be applied to identify themes from the qualitative data in study two, with data quality ensured through member checking. Coding will be performed by the principal investigator, and a second coder will verify the coding for authenticity. MAXQDA software will be used to manage and analyze the data. Debriefing sessions will be conducted with research supervisors to review the research process, findings, and data interpretation.

For the scoping review in study three, findings will be presented in tabular format to map available information on the types of HIV-related disability interventions. A summary report will describe and integrate the tabulated results with reference to the review's objective and question. In the fourth study, data will be analyzed by summarizing using measures of central tendency (mean, median, and mode), frequencies, and percentages to present information relating to descriptive statistics and the collective judgments of participants. Thematic content analysis will be utilized to summarize the suggestions from experts and present them in a tabular form.

In the fifth study, demographic characteristics of participants will be described using descriptive statistics. Data will be transcribed manually by the researcher from audio recordings. Deductive analysis will then be conducted on the transcripts, with similar codes grouped into subcategories and categories.

Ethics statement

This study has been approved by the Human Research Ethics Committee of the University of the Witwatersrand (M200906) and the Lagos State University Teaching Hospital Health Research Ethics Committee (LREC/06/10/1547). Permission has been granted by the hospitals. Written, informed consent will be obtained from all the participants.

RESULTS AND DISCUSSION

The increasing recognition of the importance of social and cultural aspects of disability among people living with HIV underscores the relevance of considering sociocultural factors in the development of exercise programs. Findings from this study will contribute to the body of knowledge on HIV-related disability, providing insight into the patterns and prevalence of HIV-related disability and factors influencing rehabilitation care. This study aims to develop a need-based exercise program that takes into account environmental, sociocultural, and socioeconomic factors to effectively manage disability among people living with HIV. Ultimately, policymakers can utilize the results of this study to inform health-promoting policies and develop treatment models for individuals living with HIV-related disability.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

REFERENCES

Achwoka D, Mutave R, Oyugi JO, Achia T (2020). Tackling an emerging epidemic: the burden of non-communicable diseases among people living with HIV/AIDS in sub-Saharan Africa. Pan African Medical Journal 36(1).

Banks LM, Zuurmond M, Ferrand R, Kuper H (2015). The relationship between HIV and prevalence of disabilities in sub-Saharan Africa: systematic review (FA). Tropical Medicine and International Health

20(4):411-429.
Bright T, Wallace S, Kuper H (2018). A Systematic Review of Access to Rehabilitation for People with Disabilities in Low- and Middle-Income Countries. International Journal of Environmental Research and Public Health 15(10):2165.
Cleland C, Ferguson S, Ellis G, Hunter RF (2018). Validity of the International Physical Activity Questionnaire (IPAQ) for assessing moderate-to-vigorous physical activity and sedentary behaviour of older adults in the United Kingdom. BMC Medical Research Methodology 18(1).
Cobbing S, Hanass-Hancock J, Myezwa H (2017a). A Home-Based Rehabilitation Intervention for Adults Living With HIV: A Randomized Controlled Trial. Journal of the Association of Nurses in AIDS Care 28(1):105-117.
Cobbing S, Hanass-Hancock J, Myezwa H (2017b). Assessing home-based rehabilitation within the development of an integrated model of care for people living with HIV in a resource-poor community. African Journal of Primary Health Care and Family Medicine 9(1).
Craig C, Marshall A, Sjostrom M, Bauman A, Lee P, Macfarlane D, Lam T, Stewart S (2017). International physical activity questionnaire-short form. Journal of American College Health 65(7):492-501.
Dang AK, Nguyen LH, Nguyen AQ, Tran BX, Tran TT, Latkin CA, Zhang MWB, Ho RCM (2018). Physical activity among HIV-positive patients receiving antiretroviral therapy in Hanoi and Nam Dinh, Vietnam: a cross-sectional study. BMJ Open 8(5):e020688.
Doyal L (2014). A decade of researching the social aspects of HIV and AIDS. The Lancet 384(9960):2102-2103.
Enichen E, Adams RB, Demmig-Adams B (2022). Physical activity as an adjunct treatment for people living with HIV? American Journal of Lifestyle Medicine 17(4):502-517.
Gabuzda D, Jamieson BD, Collman RG, Lederman MM, Burdo TH, Deeks SG, Dittmer DP, Fox HS, Funderburg NT, Pahwa SG, Pandrea I, Wilson CC, Hunt PW (2020). Pathogenesis of Aging and Age-related Comorbidities in People with HIV: Highlights from the HIV ACTION Workshop. Pathogens and Immunity 5(1):143.
Holmberg C, Gremyr A, Torgerson J, Mehlig K (2021). Clinical validity of the 12-item WHODAS-2.0 in a naturalistic sample of outpatients with psychotic disorders. BMC Psychiatry 21(1).
Ibeneme SC, Omeje C, Myezwa H, Ezeofor SN, Anieto EM, Irem F, Nnamani AO, Ezenwankwo FE, Ibeneme GC (2019). Effects of physical exercises on inflammatory biomarkers and cardiopulmonary function in patients living with HIV: a systematic review with meta-analysis. BMC Infectious Diseases 19(1).
Institute for Functional Medicine (2020). The Functional Medicine MD - Medical Symptoms Questionnaire (MSQ). https://thefunctionalmedicinemd.com/wp content/uploads/2019/12/Medical-Symptoms-Questionnaire.pdf
Kalichman SC, Shkembi B, Wanyenze RK, Naigino R, Bateganya MH, Menzies NA, Lin C-D, Lule H, Kiene SM (2020). Perceived HIV stigma and HIV testing among men and women in rural Uganda: a population-based study. The Lancet HIV 7(12):e817-e824.
Mabweazara SZ, Leach LL, Ley C (2019). Development of a context-sensitive physical activity intervention for persons living with HIV and AIDS of low socioeconomic status using the behaviour change wheel. BMC Public Health 19(1).
Mabweazara SZ, Leach LL, Ley C, Smith M, Jekauc D, Dave J, Levitt N, Lambert VE (2018). Physical activity behaviours of persons living with HIV of low socioeconomic status: domain, intensity and sociodemographic correlates. AIDS Care 31(2):255-259.
Martin K, Naclerio F, Karsten B, Vera JH (2019). Physical activity and quality of life in people living with HIV. AIDS Care 31(5):589-598.
Myezwa H, Hanass-Hancock J, Ajidahun AT, Carpenter B (2018). Disability and health outcomes – from a cohort of people on long-term anti-retroviral therapy. SAHARA-J: Journal of Social Aspects of HIV/AIDS 15(1):50-59.
Naing L, Nordin RB, Abdul Rahman H, Naing YT (2022). Sample size calculation for prevalence studies using Scalex and ScalaR calculators. BMC Medical Research Methodology 22(1).
O'Brien KK, Tynan A-M, Nixon SA, Glazier RH (2016). Effectiveness of aerobic exercise for adults living with HIV: systematic review and meta-analysis using the Cochrane Collaboration protocol. BMC Infectious Diseases 16(1).
Ogunyemi AO, Adubiaro FM, Oluwole EO, Somefun EO, Olubodun T (2022). Stigma, discrimination and non-disclosure among young people living with HIV in Lagos, Nigeria. The Pan African Medical Journal 41:106.
Olaleye O, Adetoye A, Tal-hatu KH (2017). Disability and Quality of Life among People Living With HIV/AIDS in Ibadan, Nigeria. Medical Journal of Zambia 44(3):166-175.
Palmer M, Harley D (2012). Models and measurement in disability: an international review. Health Policy and Planning 27(5):357-364.
Saeed SM, Ayuwat D (2020). A Qualitative Study of Stigma Experience by Households with People Living With HIV/AIDS in Kaduna State, Nigeria. Systematic Reviews in Pharmacy 11:1320-1328.
Safa F, McClellan N, Bonato S, Rueda S, O'Brien KK (2022). The Role of the Social Determinants of Health on Engagement in Physical Activity or Exercise among Adults Living with HIV: A Scoping Review. International Journal of Environmental Research and Public Health 19(20):13528.
Seguiti C, Salvo PF, Di Stasio E, Lamonica S, Fedele AL, Manfrida S, Ciccarelli N, Corvari B, De Luca C, Tartaglione L, Pitocco D, Cauda R, Cingolani A (2022). Health-related quality of life (HRQoL) from HIV patients' perspective: comparison of patient-reported outcome (PRO) measures among people living with HIV (PLWH) and other chronic clinical conditions. Journal of Patient-Reported Outcomes 6(1).
So-Armah K, Benjamin LA, Bloomfield GS, Feinstein MJ, Hsue P, Njuguna B, Freiberg MS (2020). HIV and cardiovascular disease. The Lancet HIV 7(4):e279-e293.
Spudich S, Clements JE (2019). HIV persistence in the central nervous system during antiretroviral therapy. AIDS 33: S103-S106.
Stelmach M (2018). Physical activity assessment tools in monitoring physical activity: the Global Physical Activity Questionnaire (GPAQ), the International Physical Activity Questionnaire (IPAQ) or accelerometers – choosing the best tools. Health Problems of Civilization 12(1):57-63.
Syed IA, Syed Sulaiman SA, Hassali MA, Thiruchelvum K, Lee CKC (2014). A qualitative insight of HIV/AIDS patients' perspective on disease and disclosure. Health Expectations 18(6):2841-2852.
Tesfay F, Javanparast S, Mwanri L, Ziersch A (2020). Stigma and discrimination: barriers to the utilisation of a nutritional program in HIV care services in the Tigray region, Ethiopia. BMC Public Health 20(1).
UNAIDS (2023). Global HIV & AIDS Statistics-2022 Fact Sheet. UNAIDS. https://www.unaids.org/en/resources/fact-sheet
Üstün TB, Chatterji S, Kostanjsek N, Rehm J, Kennedy C, Epping-Jordan J, Saxena S, von Korff M, Pull C (2010). Developing the World Health Organization Disability Assessment Schedule 2.0. Bulletin of the World Health Organization 88(11):815-823.
Vancampfort D, Stubbs B, Mugisha J (2018). Physical activity and HIV in sub-Saharan Africa: a systematic review of correlates and levels. African Health Sciences 18(2).
Voigt N, Cho H, Schnall R (2018). Supervised Physical Activity and Improved Functional Capacity among Adults Living with HIV: A Systematic Review. Journal of the Association of Nurses in AIDS Care 29(5):667-680.
Walker-Bone K, Doherty E, Sanyal K, Churchill D (2017). Assessment and management of musculoskeletal disorders among patients living with HIV. Rheumatology 56(10):1648-1661.
Wu AW, Revicki DA, Jacobson D, Malitz FE (1997). Evidence for reliability, validity and usefulness of the Medical Outcomes Study HIV Health Survey (MOS-HIV). Quality of Life Research 6(6):481-493.
Yen HY, Li C (2019). Correction: Determinants of physical activity: A path model based on an ecological model of active living. PLOS ONE 14(9):e0222625.
Zicari S, Sessa L, Cotugno N, Ruggiero A, Morrocchi E, Concato C, Rocca S, Zangari P, Manno E, Palma P (2019). Immune Activation, Inflammation, and Non-AIDS Co-Morbidities in HIV-Infected Patients under Long-Term ART. Viruses 11(3):200.