

Research



Physical activity counselling in people with suicidal ideation: a secondary analysis of a pilot study in Ugandan primary care settings

 Davy Vancampfort,  James Mugisha,  Simon Rosenbaum,  Tine Van Damme

Corresponding author: Davy Vancampfort, KU Leuven Department of Rehabilitation Sciences, Leuven, Belgium.
davy.vancampfort@kuleuven.be

Received: 03 Apr 2023 - **Accepted:** 29 Jun 2024 - **Published:** 07 Aug 2024

Keywords: Anxiety, depression, physical activity, suicide

Copyright: Davy Vancampfort et al. Pan African Medical Journal (ISSN: 1937-8688). This is an Open Access article distributed under the terms of the Creative Commons Attribution International 4.0 License (<https://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Cite this article: Davy Vancampfort et al. Physical activity counselling in people with suicidal ideation: a secondary analysis of a pilot study in Ugandan primary care settings. Pan African Medical Journal. 2024;48(160). 10.11604/pamj.2024.48.160.39919

Available online at: <https://www.panafrican-med-journal.com//content/article/48/160/full>

Physical activity counselling in people with suicidal ideation: a secondary analysis of a pilot study in Ugandan primary care settings

Davy Vancampfort^{1,2,&}, James Mugisha³, Simon Rosenbaum⁴, Tine Van Damme^{1,2}

¹KU Leuven Department of Rehabilitation Sciences, Leuven, Belgium, ²University Psychiatric Centre KU Leuven, Leuven-Kortenberg, Belgium, ³Department of Sociology and Social Administration, Kyambogo University, Kampala, Uganda, ⁴School of

Psychiatry, University of New South Wales, Sydney, New South Wales, Australia

&Corresponding author

Davy Vancampfort, KU Leuven Department of Rehabilitation Sciences, Leuven, Belgium

Abstract

Introduction: primary care settings are ideal to implement suicide risk reduction initiatives in low- and middle-income countries. Health staff working in primary care settings are often over-burdened and under-resourced. Task-shifting through lifestyle counseling by lay health workers might be a relevant intervention. The aim of this secondary analysis from a pilot study exploring the efficacy of lay health worker (LHW)-led physical activity (PA) counselling for primary care patients with mental health problems (PCMH) was to investigate the efficacy of PA on reducing suicidal ideation. **Methods:** from 130 Ugandan PCMH screened in two centers, 8.5% (n=11) reported suicidal ideation. These 11 PCMH (9 ♀, median age= 52 years, interquartile range= 37 years) participated once weekly for 8 weeks in group PA counselling based on the mental contrasting and implementation of intentions framework. All participants completed the Patient Health Questionnaire-9 (PHQ-9), Generalized Anxiety Disorder-7 (GAD-7), and the Simple Physical Activity Questionnaire (SIMPAQ) pre- and immediately post-intervention. **Results:** in PCMH with suicidal ideation (PHQ-9 item 9≥1) the prevalence of suicidal ideation dropped to 9% post-intervention, i.e. only one patient reported suicidal ideation post-intervention. Following the intervention, significant ($P<0.05$) increases in walking, exercising and incidental PA (SIMPAQ) levels, and reductions in depressive and anxiety symptoms were observed. **Conclusion:** our data demonstrate that LHW-led PA counselling might be promising intervention in reducing suicidal ideation in primary care patients in low-resourced settings. Randomized controlled trials are warranted to confirm these beneficial findings.

Introduction

Suicide is among the leading global causes of death, with over 75% of all suicides occurring in low- and middle-income countries (LMICs) [1]. A study in five LMICs demonstrated that 10.3% of

people presenting at primary care facilities reported suicidal ideation within the past year, and 2.2% reported attempting suicide in the same period [2]. While in LMICs suicidal ideation ranges from 3.5 to 11.1% in community samples, this increases up to 14.8% in those attending primary care facilities [2]. Primary care settings are therefore ideal environments to implement suicide risk reduction initiatives. However, while in LMICs, such as Uganda, most primary care providers are knowledgeable about suicide and associated risk factors, they report challenges in assessing and managing individuals with suicide risk [3]. For example, a recent study in 7,958 health facilities across seven LMICs demonstrated that amitriptyline, an antidepressant classified as essential by the World Health Organization (WHO) [4], was available in only 8% of the primary care settings on the day of assessment [5]. Therefore, non-pharmacological interventions to reduce suicidal ideation among primary care patients with mental health problems (PCMH) are essential. However, a key gap is the lack of integration of psychotherapeutic interventions as a part of accessible evidence-based primary care [6]. One of the contributing factors is that most primary care centers in LMICs have very few trained mental health specialists and an overburdened workforce [7] resulting in psychological care often being delivered via task-shifting (i.e., having providers without specialized mental health training delivering mental health interventions) [8].

Recently, the role of lifestyle psychiatry has been acknowledged as a promising non-pharmacological strategy for reducing the mental health burden in LMICs, in particular when delivered via lay health workers [9,10]. Physical activity is a low-cost lifestyle intervention which demonstrated to be promising in reducing suicidal risk [11]. However, the few existing trials were executed in high-income countries and real-world interventions in low-income countries are lacking. Exploring the effectiveness and efficacy in real-world interventions and those delivered by non-experts, but supervised by experts, is important,

particularly because drop-out rates from physical activity interventions are as high as 20 to 30% in people experiencing mental health problems high [12-15]. Therefore, in recent years, several calls were made to explore novel, innovative and culturally-sensitive approaches to reduce the burden of poor mental health via lifestyle interventions [10,16]. One strategy which has been applied successfully via task-shifting by lay health workers is the mental contrasting with implementation of intentions methodology [17]. Mental contrasting entails an expectancy-based form of goal-setting whereby after specifying a goal (e.g., to become more physically active) individuals denominate and imagine the most beneficial outcome of successfully changing their behavior (e.g., feeling more fit or energetic), followed by denominating and imagining the most salient obstacle that prevents them from realizing their goal (e.g., experienced fatigue) [17]. Implementation of intentions involves “if-then” plans that specify when, where, and how the goal intention should be implemented (e.g., “If I feel too tired for a walk, then I will call my support partner to join me.”) [18].

In a pilot study [19], we demonstrated that 8-weeks of weekly physical activity counseling based on the principles of mental contrasting and implementation of intentions significantly ($P < 0.001$) increased walking, exercising and incidental physical activity levels, and reduced depressive and anxiety symptoms in PCMH. The aim of this secondary analysis of our pilot study was to explore the efficacy in reducing levels of suicidal ideation in those who presented at the start with suicidal ideation. A secondary aim of the current study was to explore whether any changes in suicidal ideation were accompanied by changes in depression, anxiety, and physical activity levels. We hypothesize that physical activity counselling delivered via lay health workers, under supervision of a psychiatrist clinical officer, will reduce suicidal ideation and is accompanied by reductions in anxiety and depression and increases in physical activity levels.

Methods

Study design: this is a secondary analysis of a pre-test/post-test study without a control group [19].

Study setting: this study that took place in two health centers in poor communities in Mpigi district in Central Uganda.

Study population

Patients attending the primary care center were eligible for the original pilot study if they (a) were aged 18 or older years, (b) met criteria for at least mild depressive symptoms (Patient Health Questionnaire-9 score of 5 or higher) [20], and / or anxiety symptoms (Generalized Anxiety Disorder - 7 score of 5 or higher) [21], (c) were not complying with the internationally recommended target of 150 minutes per week of moderate to vigorous physical activity as assessed with the Physical Activity Vital Sign method [22], and (d) had no risks for physical activity counseling as assessed with the Physical Activity Readiness Questionnaire [23]. In total 130 of 139 PCMH [median (interquartile range) age=47.0 (22.0); 73.1% (n=95) female] agreed to participate in the pre-intervention screening. The nine potential participants who declined were all not interested due to practical, professional reasons (e.g., too busy) and their reasons for decline were not related to clinical or health-related reasons. Of the 130 interested patients, 53 reported either mild symptoms of depression and/or anxiety and were physically inactive and therefore eligible. None had contra-indications for being physically active. Four participants dropped out and were lost for follow-up. Forty-nine patients completed the trial and of these 49, eleven presented with suicidal ideation at baseline. In agreement with recent Ugandan studies [24,25], suicidal ideation was in this secondary analysis considered present when participants scored 1 or higher on item 9 of the Patient Health Questionnaire-9 (PHQ-9) [20].

Study sampling: for one month, all primary care patients visiting one of the two health centers

irrespective of the reason for visiting the health center and who agreed were screened by a psychiatrist clinical officer. The health centers were purposively selected by the local health district office as having a larger number of people with mental health issues as compared to other health centers. One health center was located in a relatively busy trading center while the other one was in a rural area.

Study intervention

The study leaders first approached the local leader of the district health system who advised on the health facilities where this study was to be conducted. The health centers chosen in this study were at the level of Health Centre III (based on the Uganda Ministry of Health Administrative structure). The lowest administrative level in the health sector in Uganda is the village health team and this is equivalent to Health Centre I. These village health teams are normally at the center of most community-based health interventions [26]. Village health team members are unsalaried community health workers recommended by their own communities and with basic health training which last about 5 to 7 days [27]. They are normally at least 18 years old, should regularly reside in the village, and literate in the local language [28]. Selection criteria were being physically active (self-reported), and a community health champion (recognized by the village health team and local staff of the health centers), trustworth and having experience in providing lay counselling. Selection was done by the staff of the involved health centers who knew the village health teams and local communities well.

The selected lay health workers received a one-day training in motivational interviewing [29] and in adopting the mental contrasting with implementation of intentions framework [17,18]. Within this framework [17,18] PCMH were facilitated by the lay health workers to consider and elaborate upon the most positive outcome they associated with achieving their daily physical activity goals. Elaboration included visualizing the

events or experiences associated with this outcome considering the local context in the farming community. Following this, lay health workers requested PCMH to consider and elaborate upon important obstacles that could potentially impede their ability to achieve this daily physical activity goal. Prompting questions included, 'Why would this make it hard for you to achieve your goal?' and 'When and where would this occur?'. Special attention was given by lay health workers, support partners and PCMH to the local context. PCMH were then asked to think of an action that would overcome the obstacle and complete the following sentence regarding each specified obstacle: 'If I (obstacle), then I will (action)'. Participants were encouraged to repeat their if-then plans aloud and endeavor to implement these daily in the coming week. In formulating intentions and developing an action plan, the lay health workers paid special attention to the importance of social support. Social support partners were able to attend the sessions. Village health team members were regularly monitored by the psychiatrist clinical officer while review meetings were organized every two weeks. The project team also supported activities regularly as they visited patients at village level and provided information, education and communication materials. For project sustainability, village health team members were encouraged to form groups for income generation and trained in entrepreneurship skills. More details of the intervention are described elsewhere [19].

Study variables

Socio-demographical and clinical variables: patients were asked whether they had a paid job / were employed (yes versus no). Age, gender, smoking (yes versus no, and if yes how many cigarettes per day), and the presence of chronic somatic comorbidities (yes versus no, with conditions lasting longer than 3 months defined as chronic) were self-reported and, when possible, confirmed via the medical files. Multimorbidity was considered being present if two or more chronic somatic comorbidities were reported. For

calculating the body mass index (BMI), weight was measured in light clothing to the nearest 0.1 kg using a SECA beam balance scale, and height to the nearest 0.1 cm using a wall-mounted stadiometer.

Patient Health Questionnaire -9 (PHQ-9) [20]

Patients completed the Luganda version of the PHQ-9 [20] pre- and post-intervention. The nine items are based directly on the nine diagnostic criteria for major depressive disorder in the DSM-IV (American Psychiatric Association, 1994). For each item, the individual is asked to rate the severity of his or her symptoms over the past two weeks, scored on a Likert scale with symptoms rated as 0 (not at all), 1 (several days), 2 (more than half the days) and 3 (nearly every day). Higher scores indicate more severe symptoms of depression. Suicidal ideation was considered present when the participants scored 1 or higher on item 9 evaluating suicidal ideation in the past two weeks. The PHQ-9 has a good internal consistency reliability, test-retest reliability, and construct validity and has been used previously in people with mental health problems in Uganda [30,31]. The Cronbach's alpha for the PHQ-9 in the pilot study was 0.74 [19].

Generalized Anxiety Disorder -7 (GAD-7) [21]

Patients completed the Luganda version of the GAD-7 pre- and post-intervention. The GAD-7 is a seven-item instrument that is used to assess the severity of generalized anxiety disorder (GAD). For each item, the individual is asked to rate the severity of his or her symptoms over the past two weeks, by providing a score on a Likert scale with symptoms rated as 0 (not at all), 1 (several days), 2 (more than half the days) and 3 (nearly every day). Higher scores indicate more severe symptoms of generalized anxiety. The GAD-7 has been used previously in people with mental health problems in Uganda [32]. The Cronbach's alpha for the GAD-7 in the pilot study was 0.80 [19].

Simple Physical Activity Questionnaire (SIMPAQ) [33]

Physical activity was assessed pre- and post-intervention in patients and support partners with the Luganda version of the SIMPAQ [33]. The SIMPAQ [33] is a 5-item clinical tool to assess physical activity among populations at high risk for sedentary behavior. It uses an interview format to estimate time spent in bed (min/day), time spent sedentary during waking hours (min/day), time spent napping (min/day), time spent walking (min/day), time spent in structured exercise (min/day), and time spent in incidental or non-structured physical activity (min/day) during the past week. The sum of the hours recorded in the SIMPAQ items should add to approximately 24-hours, providing interviewers with an opportunity to clarify if participants significantly under or over-reported (e.g. total of <18 hours or >30 hours accounted for). Previous research in Uganda demonstrated the questionnaire is reliable [34], while validity has been demonstrated in a 23-country validation study [35]. In this study, we used time spent walking (min/day), time spent in structured exercise (min/day), and time spent in incidental or non-structured physical activity (min/day) during the past week. Digging was considered a structured activity of moderate to vigorous intensity and therefore presented as an example under structured exercise in this farmer community.

Study procedure: all eleven participants with suicidal ideation were assessed pre- and immediately post-intervention.

Statistical analyses: data were tested for normality using the Shapiro-Wilks test and found not to be normally distributed. Changes in outcome measures were evaluated using Wilcoxon signed-rank tests ($P < 0.05$). SPSS version 28.0 (SPSS Inc., Chicago) was used for all data analyses.

Ethical considerations: written informed consent was obtained from all these participants, with illiterate participants providing consent via a

fingerprint. The pilot study was approved by the ethical committee of Mengo Hospital.

Results

Participants

Of the 130 PCMH screened at baseline, eleven reported suicidal ideations (prevalence = 8.5%). These 11 PCMH [median (interquartile range, IQR) age=52.0 (37.0); 9 women] were included in this secondary analysis study. Six participants reported to be a farmer, one a tailor and four were not working or retired. The median body mass index was 19.7 (IQR=3.6). Two participants smoked and both reported smoking 2 cigarettes per day. One patient reported chronic asthma, one chronic cardiovascular symptoms, one chronic low back pain and two chronic joint pain. One patient suffered longer than 3 months from abdominal pain. No patient reported multi-morbidity, i.e. two or more chronic conditions, indicating that 6 out of 11 patients reported having a chronic physical condition.

Changes in suicidal ideation, depression, anxiety and physical activity levels following the 8-week lay health workers- led physical activity counselling in PCMH

Between baseline and 8 weeks, the prevalence of suicidal ideation reduced from 100 to 9.1% ($P=0.002$). Only one participant reported suicidal ideation post-intervention. The score on item 9 for suicidal ideation on the PHQ-9 increased in this patient from 1 to 3. Other changes in time of the clinical characteristics in PCMH are presented in Table 1.

Discussion

To the best of our knowledge, the current pilot study is the first to demonstrate that in a poor farming community, 8-weeks of lay health worker-led physical activity counselling based on mental contrasting with implementation of intentions principles [17], is associated with a reduction in

suicidal ideation in the majority of PCMH reporting suicidal risk. Our findings are clinically relevant since the prevalence of suicidal ideation in the screened PMCH is roughly one in ten, which is in line with the 5.0-14.8% range observed in those attending primary care facilities in other LMICs [2]. Second, the findings are clinically relevant since existing key staff members in primary care centers experience challenges in assessing and managing individuals with suicide risk [7]. Our data suggest that task-shifting and involving lay health workers who could focus on lifestyle counseling might be a promising component of treatment. However, lifestyle counseling is not a stand-alone treatment and should be offered within a multidisciplinary approach [9], in particular knowing that in one of the 11 participants suicidal ideation worsened. Therefore, supervision by an expert such as a psychiatrist clinical officer is essential.

A secondary finding was that in the eleven patients, levels of depression and anxiety also reduced, while levels of physical activity increased. One of the potential underlying mechanisms for the reduced suicidal ideation therefore might be the observed reduction in depressive and anxiety feelings. Both of which are known risk factors for suicide in Uganda [36,37], and likely reduced in response to participants' being more physically active. There are several neurobiological and psychosocial pathways that could clarify the observed reduction in suicidal ideation and mental health symptoms associated with being more physically active. For example, neurobiological changes such as an increased cerebral blood flow and changes in peripheral biomarkers such as an increase in circulating neurotrophic growth factors, and anti-inflammatory markers have been reported before [38]. From a psychosocial perspective physical activity provides people with an opportunity for social interaction (relatedness) and independence (autonomy) when recovering, and mastery in the physical domain (increased self-efficacy and perceived competence) [39]. For the latter, the potential efficacy of mental contrasting with implementation of intentions principles is of particular of interest. The

methodology exhibits several advantages as an augmentation to usual care in those at risk for suicidal behavior in primary care settings. Not only does it increase commitment to cope with mental health problems, but it also enables people to identify the significance of daily life obstacles that act as barriers. Moreover, it motivates patients to overcome the identified obstacles [17]. The methodology is simple to use, brief, and an engaging exercise which does not require lengthy training. Our study suggests that it could also be a valuable approach in a resource and time-limited primary health care context and can be delivered by lay health workers in poor communities as a vital add-on strategy to increase access to mental health care [40].

Limitations and future research

The findings of the present study should be interpreted with caution due to some methodological limitations. First, although suicidal ideation reported via item 9 of the PHQ-9 is a robust predictor of suicide attempts and deaths regardless of age [41], it should be noted that the PHQ-9 was designed to screen for depression and assess its severity, not to assess risk for suicide. Second, the one-group quasi-experimental research design with a modest sample size limits the validity and generalizability of the current findings. Third, physical activity was only measured with a self-report questionnaire, which is prone to both systematic and random errors [42]. Fourth, no long-term follow-up was done after the counselling cessation. Fifth, we did not have information on concurrent psychotropic medication use and adherence. Randomized controlled studies using longer-term follow-up are therefore recommended before concluding that physical activity counselling led by lay health workers and using mental contrasting with implementation of intentions principles is an efficacious intervention for reducing suicidal ideation in low-resourced environments. Lastly, research is needed to investigate in more detail the cost-effectiveness of interventions led by lay

health workers versus by health professionals in these challenging environments.

Conclusion

Despite the reported limitations, this secondary analysis demonstrates that an 8-week physical activity counselling based on the principles of mental contrasting with implementation of intentions principles [17] is associated with lower suicidal ideation for PCMH. Reductions in suicidal ideation are accompanied with reductions in depressive and anxiety symptoms and higher levels of physical activity.

What is known about this topic

- *Suicide is among the leading global causes of death, with over 75% of all suicides occurring in low-and middle-income countries;*
- *Most primary care providers in low- and middle-income countries are knowledgeable about suicide and associated risk factors, but they report challenges in assessing and managing suicide risk;*
- *Physical activity is a low-cost lifestyle intervention which demonstrated to be promising in reducing suicidal risk in some high-income countries.*

What this study adds

- *Lay health workers-led physical activity counselling reduces suicidal ideation in primary care patients in low-resourced settings;*
- *Reduced suicidal ideation is accompanied by reduced levels of depression and anxiety, while levels of physical activity increased;*
- *The mental contrasting with implementation of intentions methodology might be a promising strategy to support primary care patients in low-resourced settings in becoming more physically active.*

Competing interests

The authors declare no competing interests.

Funding

This research was funded by KU Leuven Global Minds.

Authors' contributions

All authors contributed in the development process of the current work. James Mugisha and Davy Vancampfort conceptualised the study. Data were collected by James Mugisha and analysed by Davy Vancampfort. James Mugisha and Davy Vancampfort wrote the first draft which was reviewed and revised in several rounds by all authors. All authors certify that they have participated sufficiently in the work to believe in its overall validity and to take public responsibility for appropriate portions of its content. They equally read and approved the final version of the manuscript.

Acknowledgments

We would like to thank the participating health centers and village health team's members.

Table

Table 1: changes in clinical variables in primary care patients with suicidal ideation (n=11) following 8 weeks of lay health workers led physical activity counselling

References

1. World Health Organization. Suicide worldwide in 2019: global health estimates. 2021. **Google Scholar**

2. Jordans M, Rathod S, Fekadu A, Medhin G, Kigozi F, Kohrt B *et al.* Suicidal ideation and behaviour among community and health care seeking populations in five low-and middle-income countries: a cross-sectional study. *Epidemiology and Psychiatric Sciences*. 2018 Aug;27(4): 393-402 Epub 2017 Feb 16. **PubMed | Google Scholar**
3. Rukundo GZ, Wakida EK, Maling S, Kaggwa MM, Sserumaga BM, Atim LM *et al.* Knowledge, attitudes, and experiences in suicide assessment and management: a qualitative study among primary health care workers in southwestern Uganda. *BMC Psychiatry*. 2022 Sep 12;22(1): 605. **PubMed | Google Scholar**
4. World Health Organization. The selection and use of essential medicines: report of the WHO Expert Committee on Selection and Use of Essential Medicines, 2021 (including the 22nd WHO model list of essential medicines and the 8th WHO model list of essential medicines for children). 2021. **Google Scholar**
5. Rahman MA, Babaye Y, Bhat A, Collins PY, Kemp CG. Availability of two essential medicines for mental health in Bangladesh, the Democratic Republic of Congo, Haiti, Nepal, Malawi, Senegal, and Tanzania: Evidence from nationally representative samples of 7958 health facilities. *Journal of Global Health*. 2022 Aug 1; 12: 04063. **PubMed | Google Scholar**
6. Hook K, Ametaj A, Cheng Y, Serba EG, Henderson DC, Hanlon C *et al.* Psychotherapy in a resource-constrained setting: Understanding context for adapting and integrating a brief psychological intervention into primary care. *Psychotherapy*. 2021 Dec;58(4): 557-575. **PubMed | Google Scholar**
7. Rathod S, Pinninti N, Irfan M, Gorczynski P, Rathod P, Gega L *et al.* Mental health service provision in low-and middle-income countries. *Health Services Insights*. 2017 Mar 28; 10: 1178632917694350. **PubMed | Google Scholar**

8. Adler AJ, Drown L, Boudreaux C, Coates MM, Marx A, Akala O *et al.* Understanding integrated service delivery: a scoping review of models for noncommunicable disease and mental health interventions in low-and-middle income countries. *BMC Health Services Research*. 2023 Jan 30;23(1): 99. **PubMed** | **Google Scholar**
9. Firth J, Solmi M, Wootton RE, Vancampfort D, Schuch FB, Hoare E *et al.* A meta-review of “lifestyle psychiatry”: the role of exercise, smoking, diet and sleep in the prevention and treatment of mental disorders. *World Psychiatry*. 2020 Oct;19(3): 360-380. **PubMed** | **Google Scholar**
10. Firth J, Siddiqi N, Koyanagi A, Siskind D, Rosenbaum S, Galletly C *et al.* The Lancet Psychiatry Commission: a blueprint for protecting physical health in people with mental illness. *The Lancet Psychiatry*. 2019 Aug;6(8): 675-712. **PubMed** | **Google Scholar**
11. Vancampfort D, Hallgren M, Firth J, Rosenbaum S, Schuch FB, Mugisha J *et al.* Physical activity and suicidal ideation: A systematic review and meta-analysis. *Journal of Affective Disorders*. 2018 Jan 1; 225: 438-448 Epub 2017 Aug 24. **PubMed** | **Google Scholar**
12. Vancampfort D, Firth J, Schuch FB, Rosenbaum S, Probst M, Ward PB *et al.* Dropout from physical activity interventions in children and adolescents with attention deficit hyperactivity disorder: a systematic review and meta-analysis. *Mental Health and Physical Activity*. 2016;11: 46-52. **Google Scholar**
13. Vancampfort D, Rosenbaum S, Schuch FB, Ward PB, Probst M, Stubbs B. Prevalence and predictors of treatment dropout from physical activity interventions in schizophrenia: a meta-analysis. *General Hospital Psychiatry*. 2016 Mar-Apr; 39: 15-23 Epub 2015 Dec 2. **PubMed** | **Google Scholar**
14. Vancampfort D, Sánchez CPR, Hallgren M, Schuch F, Firth J, Rosenbaum S *et al.* Dropout from exercise randomized controlled trials among people with anxiety and stress-related disorders: a meta-analysis and meta-regression. *Journal of Affective Disorders*. 2021 Mar 1; 282: 996-1004 Epub 2021 Jan 6. **PubMed** | **Google Scholar**
15. Stubbs B, Vancampfort D, Rosenbaum S, Ward PB, Richards J, Soundy A *et al.* Dropout from exercise randomized controlled trials among people with depression: A meta-analysis and meta regression. *Journal of Affective Disorders*. 2016 Jan 15; 190: 457-466 Epub 2015 Oct 29. **PubMed** | **Google Scholar**
16. Dempsey PC, Friedenreich CM, Leitzmann MF, Buman MP, Lambert E, Willumsen J *et al.* Global Public Health Guidelines on Physical Activity and Sedentary Behavior for People Living With Chronic Conditions: A Call to Action. *Journal of Physical Activity and Health*. 2021 Jan 1;18(1): 76-85 Epub 2020 Dec 4. **PubMed** | **Google Scholar**
17. Oettingen G, Mayer D, Timur Sevincer A, Stephens EJ, Pak H-J, Hagenah M. Mental contrasting and goal commitment: the mediating role of energization. *Personality and Social Psychology Bulletin*. 2009 May;35(5): 608-22 Epub 2009 Feb 12. **PubMed** | **Google Scholar**
18. Gollwitzer PM. Implementation intentions: strong effects of simple plans. *American psychologist*. 1999;54(7): 493. **Google Scholar**
19. Vancampfort D, Mugisha J, Byansi PK, Namutebi H, Rosenbaum S, Lukwata H *et al.* Mental contrasting and implementation of physical activity intentions in Ugandan primary care patients with mental health problems: A real-world intervention involving support partners. *Psychiatry Research*. 2022 Jan; 307: 114335. **PubMed** | **Google Scholar**
20. Spitzer RL, Williams JB, Kroenke K, Linzer M, deGruy FV, Hahn SR *et al.* Utility of a new procedure for diagnosing mental disorders in primary care: the PRIME-MD 1000 study. *JAMA*. 1994 Dec 14;272(22): 1749-56. **PubMed** | **Google Scholar**

21. Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Archives of Internal Medicine*. 2006 May 22;166(10): 1092-7. **PubMed** | **Google Scholar**
22. Greenwood JL, Joy EA, Stanford JB. The physical activity vital sign: a primary care tool to guide counseling for obesity. *Journal of Physical Activity and Health*. 2010 Sep;7(5): 571-6. **PubMed** | **Google Scholar**
23. Thomas S, Reading J, Shephard RJ. Revision of the physical activity readiness questionnaire (PAR-Q). *Canadian Journal of Sport Sciences*. 1992 Dec;17(4): 338-45. **PubMed** | **Google Scholar**
24. Kaggwa MM, Arinaitwe I, Nduhuura E, Muwanguzi M, Kajjimu J, Kule M *et al*. Prevalence and factors associated with depression and suicidal ideation during the COVID-19 pandemic among university students in Uganda: A cross-sectional study. *Frontiers in Psychiatry*. 2022 Apr 14; 13: 842466. **PubMed** | **Google Scholar**
25. Muwanguzi M, Kaggwa MM, Najjuka SM, Mamun MA, Arinaitwe I, Kajjimu J *et al*. Exploring adverse childhood experiences (ACEs) among Ugandan university students: its associations with academic performance, depression, and suicidal ideations. *BMC Psychology*. 2023 Jan 13;11(1): 11. **PubMed** | **Google Scholar**
26. Mays DC, O'Neil EJ, Mworozzi EA, Lough BJ, Tabb ZJ, Whitlock AE *et al*. Supporting and retaining Village Health Teams: an assessment of a community health worker program in two Ugandan districts. *International Journal of Equity in Health*. 2017 Jul 20;16(1): 129. **PubMed** | **Google Scholar**
27. Ojo TT, Hawley NL, Desai MM, Akiteng AR, Guwatudde D, Schwartz J. Exploring knowledge and attitudes toward non-communicable diseases among village health teams in Eastern Uganda: a cross-sectional study. *BMC Public Health*. 2017 Dec 12;17(1): 947. **PubMed** | **Google Scholar**
28. Turinawe EB, Rwemisisi JT, Musinguzi LK, de Groot M, Muhangi D, de Vries DH *et al*. Selection and performance of village health teams (VHTs) in Uganda: lessons from the natural helper model of health promotion. *Human Resources for Health*. 2015 Sep 7: 13: 73. **PubMed** | **Google Scholar**
29. Miller WR, Rollnick S. *Motivational interviewing: Helping people change*: Guilford press. 2012. **Google Scholar**
30. Vancampfort D, Basangwa D, Nabanoba J, Smith L, Mugisha J. Motives for physical activity in the adoption and maintenance of physical activity in middle-aged and old age outpatients with a mental disorder: A cross-sectional study from a low-income country. *Psychiatry Research*. 2019 Dec: 282: 112620. **PubMed** | **Google Scholar**
31. Nakku J, Rathod S, Kizza D, Breuer E, Mutyaba K, Baron E *et al*. Validity and diagnostic accuracy of the Luganda version of the 9-item and 2-item Patient Health Questionnaire for detecting major depressive disorder in rural Uganda. *Global Mental Health*. 2016 Jun 20: 3: e20. **PubMed** | **Google Scholar**
32. Mugisha J, Byansi PK, Kinyanda E, Bbosa RS, Damme TV, Vancampfort D. Moderate to severe generalized anxiety disorder symptoms are associated with physical inactivity in people with HIV/AIDS: a study from Uganda. *International journal of STD & AIDS*. 2021 Feb;32(2): 170-175. **PubMed** | **Google Scholar**
33. Rosenbaum S, Ward PB. The Simple Physical Activity Questionnaire. *The Lancet Psychiatry*. 2016 Jan;3(1): e1. **PubMed** | **Google Scholar**
34. Vancampfort D, Basangwa D, Rosenbaum S, Ward PB, Mugisha J. Test-retest reliability and correlates of the Simple Physical Activity Questionnaire in Ugandan out-patients with psychosis. *African Health Sciences*. 2020 Sep;20(3): 1438-1445. **PubMed** | **Google Scholar**

35. Rosenbaum S, Morell R, Abdel-Baki A, Ahmadpanah M, Anilkumar TV, Baie L *et al.* Assessing physical activity in people with mental illness: 23-country reliability and validity of the simple physical activity questionnaire (SIMPAQ). *BMC Psychiatry*. 2020 Mar 6;20(1): 108. **PubMed** | **Google Scholar**
36. Bukenya B, Kasirye R, Lunkuse J, Kinobi M, Vargas SM, Legha R *et al.* Depression, anxiety, and suicide risk among Ugandan youth in vocational training. *Psychiatric Quarterly*. 2022 Jun;93(2): 513-526. **PubMed** | **Google Scholar**
37. Najjuka SM, Checkwech G, Olum R, Ashaba S, Kaggwa MM. Depression, anxiety, and stress among Ugandan university students during the COVID-19 lockdown: an online survey. *African Health Sciences*. 2021 Dec;21(4): 1533-1543. **PubMed** | **Google Scholar**
38. Voss MW, Vivar C, Kramer AF, van Praag H. Bridging animal and human models of exercise-induced brain plasticity. *Trends in cognitive sciences*. 2013 Oct;17(10): 525-44 Epub 2013 Sep 9. **PubMed** | **Google Scholar**
39. Schuch FB, Vancampfort D. Physical activity, exercise, and mental disorders: it is time to move on. *Trends in Psychiatry and Psychotherapy*. 2021 Jul-Sep;43(3): 177-184 Epub 2021 Apr 21. **PubMed** | **Google Scholar**
40. Mugisha J, Abdulmalik J, Hanlon C, Petersen I, Lund C, Upadhaya N *et al.* Health systems context (s) for integrating mental health into primary health care in six Emerald countries: a situation analysis. *International Journal of Mental Health Systems*. 2017 Jan 5: 11: 7 eCollection 2017. **PubMed** | **Google Scholar**
41. Rossom RC, Coleman KJ, Ahmedani BK, Beck A, Johnson E, Oliver M *et al.* Suicidal ideation reported on the PHQ9 and risk of suicidal behavior across age groups. *Journal of Affective Disorders*. 2017 Jun: 215: 77-84. **PubMed** | **Google Scholar**
42. Soundy A, Roskell C, Stubbs B, Vancampfort D. Selection, use and psychometric properties of physical activity measures to assess individuals with severe mental illness: a narrative synthesis. *Archives of Psychiatric Nursing*. 2014 Apr;28(2): 135-51. **PubMed** | **Google Scholar**

Table 1: changes in clinical variables in primary care patients with suicidal ideation (n=11) following 8 weeks of lay health workers led physical activity counselling

Variables	Pre-test Median (interquartile range) or %	Post-test Median (interquartile range) or %	P
Suicidal ideation (number, prevalence, %)	11/11, 100%	1/11, 9.1%	0.002*
PHQ-9 total score	11.0 (8.0)	3.0 (3.0)	0.003*
GAD-7 total score	8.0 (5.0)	2.0 (5.0)	0.006*
SIMPAQ walking (min/day)	4.0 (13.0)	39.0 (34.0)	0.004*
SIMPAQ exercise (min/day)	0.0 (0.0)	97.0 (120.0)	0.005*
SIMPAQ incidental (min/day)	20.0 (20.0)	180.0 (60.0)	0.005*

*Significant when P<0.05. GAD-7 = Generalized Anxiety Disorder - 7, PHQ -9= Patient Health Questionnaire, SIMPAQ=Simple Physical Activity Questionnaire.