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# EFFECT OF AN AFRICAN CIRCLE DANCE PROGRAMME ON MENTAL HEALTH IN INTERNALLY DISPLACED ADULTS WITH DEPRESSIVE SYMPTOMS IN AFRICA: A QUASI-EXPERIMENTAL STUDY

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**School of Nursing** 

# Effect of an African Circle Dance Programme on Mental Health in Internally Displaced Adults with Depressive Symptoms in Africa: A Quasi-Experimental Study

Dauda Salihu

A thesis submitted in partial fulfilment of the

requirement for the degree of Doctor of Philosophy

June 2021

# **CERTIFICATE OF ORIGINALITY**

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(Signed).

SALIHU Dauda (Student Name)

# DEDICATION

I would like to dedicate this thesis to my beloved mum, Sayyada Rabiatu Bn Ali (Matan Baba).

#### ACKNOWLEDGEMENTS

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### ABSTRACT

### Introduction

Internally Displaced Persons (IDPs) are a group of people that are forced to flee their place of residence secondary to manmade or natural disasters but remain within the jurisdiction of the national government. The displaced conditions such as poverty, and the lack of social support exposed them to stressors which in turn results in stress with subsequent development of depressive symptoms. Depressive symptoms manifest mental health problems of loss of interest or pleasure, sadness, guilt or low self-worth, disturbed sleep or appetite, tiredness, low concentration and depressed mood, leading to distress and impaired functioning. It was a significant problem for the person, community and society. The global prevalence of depression increases from 43.3 to 70.9 million between 2009 to 2018 of which three quarters were from ten countries (Nigeria inclusive). Depressive symptoms are managed using pharmacological and non-pharmacological interventions. The pharmacological approach was effective but associated with a side effect, high cost, or lack of purchasing power by the IDPs, and non-availability in remote locations. The nonpharmacological care approach was the supportive psychotherapy such as Teaching Recovery Techniques, classroom-based psychosocial interventions; activities with counselling intervention such as the Emotional Freedom Technique, Cognitive Behavioural Therapy, Stepped Care intervention; social investment interventions like the Economic Empowerment programme and physical activity interventions such as tai chi, yoga among others. These non-pharmacological interventions were effective, with some requiring cultural adaptation to be practised in Africa. A growing number of evidence has shown that physical activities were effective in reducing moderate and mild depression;

however, it was associated with high attrition rates. Given the high prevalence of depressive symptoms in IDPs, there is a high demand for people's psychological health needs in healthcare and social condition/contexts. Research has shown that artistic activities are particularly well accepted by disadvantaged people. The disadvantaged people refers to a group of persons who experiences a special kind of problem (e.g., displacement) associated with the lack of social and economic support which might impact their mental state. Literature evidence has shown that dance intervention effectively reduces depressive symptoms. However, there is a lack of feasible, culturally sensitive interventions in resource-deprived Africa. African Circle Dance (ACD) may be a culturally accepted intervention since dance intervention effectively reduces depressive symptoms. Dance is not like physical activity, requiring a high intensity of physical training, with mostly meaningless movements. It is an artistic activity that incorporates music and movements, and are well accepted by disadvantaged people due to its fun elements. Due to the cultural relevance of dance, adults might find it motivating and exciting. However, evidence examining there is empirical the effects of psychosocial no interventions/programme using ACD or dance interventions on depressive symptoms among IDPs despite its high prevalence.

#### Methods

The programme was designed in three phases. Before ACD protocol development, we conducted a comprehensive systematic review of the relevant literature to understand the proposed topic, necessary intervention components appropriate to treat depression in adults

as well as the evidence supporting the use of dance and underlying mechanism of actions. Review evidence led to the development of the ACD intervention protocol which was validated through a Delphi process (Phase One). In the second phase of the study, the identified outcome measures were translated and validated into the Hausa language for use in the main study (Phase Two). The developed ACD programme was pilot tested using a quasi-experimental design nested with a qualitative interview to test the acceptability, practicality and perceived usefulness of the ACD interventions. Pilot data were analysed using descriptive statistics and qualitative content analysis, after which the full-scale study was implemented. A quasi-experimental design (pre-/post-test) was employed, and this is due to fear of the subject's contamination. Two IDP camps were randomised into the intervention and control groups. Adults aged  $\geq$  18 years, living in an IDP camp, performed brisk walking, and who scored  $\geq 10$  on a depressive symptoms subscale were recruited. The intervention group received an 8-week ACD dance intervention and two 1-hour brief health education; the controls only received the brief health education sessions. Brief health education was standard care given to the IDPs in war-affected settings. The intervention dose was from the systematic review evidence via expert's panel validation. Convenience samples were recruited, and sample size were estimated using the Generalised Linear Mixed Model Power and Sample Size (GLIMMPSE). The primary outcomes were the depressive symptoms, and the secondary outcomes were the stress, anxiety, insomnia and coping strategies. Data were collected at three-time points (baseline, post-intervention, and follow-up). A generalised estimating equation was used to test the effects of the interventions, with a 0.05 significance level.

### Results

198 IDPs completed the study ( $n_{control} = 98$ ;  $n_{intervention} = 100$ ). ACD plus brief health education led to significant interactive effects for depressive symptoms (Cramer's V=.33, p<.001), stress (Cramer's V=.15, p=.008), emotion-focused coping (Cramer's V=.32, p=.003), and dysfunctional-focused (Cramer's V=28, p<.001) coping strategies. On the contrary, ACD does not add additional effects to brief health education in terms of reducing anxiety and insomnia. There were no significant interactive effects for the problem-focused coping (Cramer's V=.20, p=.161).

### Discussion

This is the first trial showing promising effects of ACD in adult IDPs on mental health and wellbeing. The evidence-based protocol was developed using a systematic review and meta-analysis which was validated by the panel of experts. ACD might augment the effects of brief health education for reducing depressive symptoms, and stress. Further, it promotes coping (emotion and dysfunctional-focused coping). However, ACD does not add additional effects on top of brief health education for insomnia and anxiety. Future studies should investigate whether ACD alone could be independently effective to reduce depressive symptoms and stress, as well as promote coping (emotion and dysfunctional-focused). The developed ACD protocol might be adopted in Africa. Similarly, the validated tools might be used for psychological assessments, while ACD may be adopted clinically as an adjunct strategy to reduce stress, depressive symptoms, and promote coping (emotion

and dysfunctional-focused coping). Future studies should investigate whether ACD alone could be independently effective to reduce depressive symptoms and stress/promote coping (emotion and dysfunctional-focused coping). Further, studies should also clarify whether coping is mediated by ACD or not.

## Conclusion

ACD showed good effects on the mental health and wellbeing of adult IDPs. ACD plus brief health education significantly reduces depressive symptoms and stress; it also promotes coping (emotion and dysfunctional-focused coping). ACD might be adopted clinically as an adjunct care approach on top of brief health education for promoting mental health and well-being.

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### LIST OF ABBREVIATIONS

IDPs Internally Displaced Persons African Circle Dance ACD TRT **Teaching Recovery Techniques** Emotional Freedom Technique EFT Cognitive Behavioural Therapy CBT Stress Inoculation Therapy SIT ACT Acceptance and Commitment Therapy **STEPCARE** Stepped Care intervention Narrative Exposure Therapy NET IPT Interpersonal Therapy **Economic Empowerment Program** EEP Major Depressive Disorder MDD MinD Minor Depressive Disorder Insomnia Severity Index ISI DASS-21 Depression Anxiety Stress Scale-21 SPSS Statistical Package for Social Sciences β Beta NY New York Μ Mean SE Standard Error MD Mean Difference SD Standard Deviation T0 Baseline **T**1 Post-intervention T2 Follow-up United States of America USA GEE Generalized Estimating Equation IQR Inter-Quantile Range Randomised Controlled Trial RCT Heteroscedastic Corrected Covariance Matrix HCCM

TIDieR checklist Template for Intervention Description and Replication Checklist

PEDro sca	ale Physiotherapy Evidence Database Scale
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
EVEA	Escala de Valoración del Estado de Ánimo
CVI	Content Validity Index
S-CVI	Scale-Content Validity Index
I-CVI	Item-Content Validity Index
NA	Not Available
GDS	Geriatric Depression Scale
BDI	Beck Depression Inventory
PMS	Profile of Mood States
HADS	Hospital Anxiety Depression Scale
BSI	Brief Symptoms Inventory
CES-D	Centre for Epidemiological Studies Depression Scale
SEMA	State Emergency Management Agency
NHS	National Health System
IEC	Information, Education and Communication
DMT	Dance Movement Therapy
CI	Confidence Interval
SMD	Standardised Mean Difference
PolyU	The Hong Kong Polytechnic University
MoH	Ministry of Health
EFA	Exploratory Factor Analysis
CFA	Confirmatory Factor Analysis
OGM	Overgeneral Memory bias

# **Publications**

# PhD Related

- Salihu, D., Wong, E.M.L, Kwan, R.Y.C. (2021). Effects of an African Circle Dance programme on internally displaced persons with depressive symptoms: A quasi-experimental study. *International Journal of Environment Research and Public Health*, 18(2), 843; <u>https://doi.org/10.3390/ijerph18020843</u> (Impact Factor: 3.390). Category Quartile: Q2
- Salihu, D., Kwan, R.Y.C., Wong, E.M.L. (2021). The effect of dancing interventions on depression symptoms, anxiety, and stress in adults without musculoskeletal disorders: Integrative review and meta-analysis. *Complementary Therapies in Clinical Practice*, <u>https://doi.org/10.1016/j.ctcp.2021.101467</u> (Impact Factor: 2.446). Category Quartile: Q2

# Non PhD related published during the PhD period

- Salihu, D; Wong E. M. L; Bello, U.M; Kwan, R.Y.C (2021). Effects of dance intervention on agitation and cognitive functioning of people living with dementia in institutional care facilities: Systematic review. *Geriatric Nursing*, 42(6), 1332-1340. <u>https://doi.org/10.1016/j.gerinurse.2021.08.015</u> (Impact Factor: 2.361) Category Quartile: Q2
- Bello, U.M., Chutiyami, M., **Salihu**, D. et al. Quality of life of stroke survivors in Africa: a systematic review and meta-analysis. *Qual Life Res* (2020). Available at: <u>https://link.springer.com/content/pdf/10.1007/s11136-020-02591-6.pdf</u> (Impact Factor: 4.147). Category Quartile: Q1.
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# **Conference Papers**

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### Awards

- Attainment of the best paper (Outstanding Oral Presentation). Award during the 23<sup>rd</sup> East Asian Forum of Nursing Scholars: Advancing Nursing Scholars in the Era of Global Transformation and Disruptive Innovation. Salihu, D., Kwan. R.Y.C., Wong, E.M.L. (2020) The Effect of Dance Intervention on Stress in Adults Living with Depression: A Systematic Review. Held 10<sup>th</sup> to 11<sup>th</sup> January 2020, Chiang Mai, Thailand. Available at: https://sn.polyu.edu.hk/enewsletter/index43.aspx?news\_id=792
- Attainment of best paper (Outstanding Poster Presentation) Award during the International Conference on Innovation in Nursing Education and Patient Care, Organised by the Hong Kong Society for Nursing Education. Salihu, D, Kwan, R.Y.C., Wong, E.M.L. (2019) A Systematic Review of the Effects of Dance on Cognitive Functioning & Quality of Life of People Living with Dementia. Held 15<sup>th</sup> to 16<sup>th</sup> March, the Mira Hotel Hong Kong, HKSAR, China. Available at: https://sn.polyu.edu.hk/cgn/doc/newsletter/2019\_Vol8\_Issue2.pdf

#### **Chapter 1. Background**

This chapter discusses the thesis introduction, then the background to the study looking at Internally Displaced Persons (IDPs), and psychological problems (depressive symptoms, stress, anxiety, and insomnia).

#### **1.1. Introduction of the Thesis Chapters**

Chapter One presents an introduction to the problem by explaining the definition of Internally Displaced Persons, depressive symptoms, and the prevalence of depression. Chapter Two contains a review of the relevant literature on depressive symptoms and the related variables (stress, anxiety, and insomnia), causes/associated factors of depressive symptoms, the conventional management methods for depressive symptoms (pharmacological and non-pharmacological interventions), dance intervention for depressive symptoms and psychological health, research gaps, the study significance, and the chapter summary. In Chapter Three, we present the conceptual framework underpinnings to justify this African Circle Dance (ACD) programme, which includes: the diathesis-stress model for depression, a reference model of dance/movement therapy in the treatment of post-traumatic stress given the evidence of the perception of interoception, and dance movement therapy; the application of dance intervention in the context of trauma; it also covers the Lazarus and Folkman stress-coping model, and African Circle Dance Programme Intervention Mediators; and these together form the conceptual framework of the ACD Programme. In Chapter Four, we present the development of the ACD intervention materials using systematic review and an expert panel. Phase two presents the validation of instruments measuring the outcomes into the Hausa African language, presented in Chapter Five. Chapter Six describes the implementation phase of the ACD Programme, and the results are presented in Chapter Seven. Finally, Chapter Eight discusses the findings, their interpretation, generalisability, and overall evidence.

### **1.2. Internally Displaced Persons**

Internally Displaced Persons is a term that refers to a group of people forced to flee their homes or place of abode due to natural disasters, armed conflict, and other forms of violence leading to the breach of their fundamental human rights, but who do not cross international borders (Mooney, 2005). IDPs are individuals exposed to internal stressors within their home countries (Tajudeen & Adebayo, 2013). The critical characteristics of IDPs are coercive (violent) nature, and the affected individuals do not cross international boundaries, but remain within the jurisdiction of their national government (Kalin, 2008). The persistent backlash of constant fear of reprisal attack has forced them to flee their homes, separated them from their families and friends, and they have abandoned their properties, businesses/occupations, neighbourhoods, and daily routines (Koch & Weidinger-von der Recke, 2009). After fleeing their homes, they live in IDP camps, schools, hospitals, communities, or other public institutions and are supported by helpers, who are individuals, as well as governmental and non-governmental organisations (Koch & Weidinger-von der Recke, 2009).

The 2001 global disaster report shows that about 31 million people are affected by armed conflicts every year, (Farhood et al., 2006), and in the last 10 years, armed conflict has killed people more than three times the number of people than natural disasters around

the world (Farhood et al., 2006; The International Federation of the Red Crescent Societies, 2001). From 2009 to 2018, the number of people forcibly displaced across the globe increased from 43.3 million to 70.9 million, of which 41.3 million people were internally displaced as a result of conflict/violence in 55 countries (Centre for Internal Displacement Monitoring, 2019). However, three-quarters (30.9 million) were from only 10 countries (United Nations High Commissioner for Refugees, 2019). According to the United Nations High Commissioner for Refugees, there were 65.6 million displaced persons globally as a result of violence, with 65% said to be internally displaced, and 80% living in urban settings (Internal Displacement Monitoring Centre, 2019; Morina et al., 2018). The total displacement secondary to conflict in 2018 was put at 28 million, of which 4.2 million resulted from armed conflict (Internal Displacement Monitoring Centre, 2019). The total displacement in Sub-Saharan Africa was n=7,446,000 representing 69.1% of the total global displacements (Internal Displacement Monitoring Centre, 2019). The African continent recorded 2.6 million (38.0%) of global 6.9 million internal displacements in 2016, and Africa was the worst-hit region as a result of conflicts and violence, increasing to 19.2 million by the year 2020 (Adeola, 2020; Gbadamosi et al., 2020; Nwalieji & Oyebanjo, 2019; Odoba, Achegbulu & Olufemi, 2020). Nigeria appears to be among the top 10 countries with the highest number of internal displacements, due to a new wave of violent conflict (Internal Displacement Monitoring Centre, 2019). Notably, by the end of 2018, over 2.2 million people were displaced in Northeastern Nigeria due to the ongoing ethnoreligious crisis of Boko Haram, and the farmers/herders conflict (Internal Displacement Monitoring Centre, 2019). This clearly shows that internal displacement is a major challenge facing humanity today.

Some IDPs work to make ends meet, or perhaps, something like, to try to make up for the economic consequences of displacement (Centre for Internal Displacement Monitoring, 2019). Studies conducted in many countries have highlighted that displaced persons are paid lower wages than the general population (Centre for Internal Displacement Monitoring, 2019). Notably, evidence from the Goma construction site in the Democratic Republic of Congo shows that IDPs were paid \$1.20 instead of \$1.80 per day on average (Centre for Internal Displacement Monitoring, 2019; Norwegian Refugee Council, 2014). Another study in Columbia showed that IDP men earned 6%-22% less than the nondisplaced population, while for women, it ranged from 17%-37% (Quintero & Gimenez-Nadal, 2016). IDPs do mostly insecure work, and are involved in micro-employment, lowskilled, and dangerous work (Centre for Internal Displacement Monitoring, 2019). In Uganda, IDPs living in camps resort to driving back and forth to different war zones to cultivate their lands, while girls and youth use gambling, dancing, and transactional sex for survival (Hammar, 2014; Namuggala, 2017). In places without income opportunities, youth might join armed groups for survival (El-Shaarawi, 2015).

Post-displacement circumstances modify the mental health of displaced persons, and those living in institutions (e.g., camps) appear to have the worst outcomes (Porter & Haslam, 2005). The home country's circumstances determine how they respond, which might be normal or abnormal, depending on the resources available for help. IDPs in camps suffer many difficulties (stressors), ranging from high rates of mortality, different from the general population, as well as poverty, and a lack of shelter, food, social support, and medical supplies, as well as increasing cases of infectious diseases, and abuse of their fundamental rights, which further contributes to their traumatic experience and poor mental health (Owoaje et al., 2016; Toole & Waldman, 1993; Uphoff et al., 2020) These negative experiences also generate a range of responses, which might lead to the presentation of depressive symptoms and associated mental health outcomes, such as stress, anxiety, and insomnia (Centre for Internal Displacement Monitoring, 2019; Owoaje et al., 2016; Uphoff et al., 2020). Governmental and non-governmental organisations support IDPs in meeting their basic life necessities, but aid is accessible mainly to those residing in camps (Sambo, 2017). What is neglected, is their psychological health.

### **1.3. Depressive Symptoms**

Depressive symptoms manifest as mental health problems that include loss of interest or pleasure, sadness, guilt or low self-worth, disturbed sleep or appetite, tiredness, low concentration, and depressed mood, leading to distress and impaired functioning (Manea et al., 2015). Depressive symptoms are different from Major Depressive Disorder (MDD) or Minor Depressive Disorder (MinD), as depression is a short duration symptom (usually within the last two weeks) that occurs in an individual and could be part of the MinD, MDD, or other distressing conditions (Maske et al., 2016). Management of depression is more generalisable; however, it is crucial to study depressive symptoms, because accurate diagnosis for depression remains a challenge that requires expertise; it can easily be identified at a lower cost and does not need a sophisticated diagnostic tool, as short questionnaires can help in identifying it (Avasthi & Ghosh, 2014). Literature evidence has shown an increase in the global prevalence of depressive symptoms in the last decade (Glanville et al., 2017). Primary care patients were found to have a nearly 30% prevalence of depressive symptoms (Zung et al., 1993). Adults 18 to 29 years were found

to have the highest number of current depressive symptoms (Busch et al., 2013). A systematic review of evidence resulted in a pooled overall prevalence of depressive symptoms of 27.0%, with the majority seen in developing countries (Glanville et al., 2017).

Depression is a clinically significant disorder or a condition with several distinctive symptoms (if not severe), affecting the individual, families, society, and a nation's economic stability. Individually, depressive symptoms lead to functional impairment that creates difficulties at work. It forestalls human potential with an increased number of suicides of approximately 800,000 people globally, as well as disability, and is associated with decreased quality of life and shorter life expectancy (Clark & Health, 2002; Sherwood Brown et al., 2014). To the family, it is correlated with increased incidence of psychopathology in other family members and an increased caregiver burden (Clark & Health, 2002). Depressive symptoms influence social relationships in society, due to individuals' social and family withdrawal; and are also associated with substance abuse and decreased work productivity (Murrock & Graor, 2016). Depressive symptoms are related to global economic decline due to loss of productivity at work and increased healthcare expenditures (Lerner et al., 2004). Hence, the need for the care and concern of depressive symptoms in the general population.

Evidence has shown a relationship between displacement and mental health (Morina et al., 2018). Some factors are known to be associated with the mental health outcomes of displaced persons. Notably, a lower mental health outcome was seen in a setting where the female population is higher, people are displaced from rural centres, people are younger adults under age 65, where pre-displacement socioeconomic status is low, or where people have little education (Porter & Haslam, 2005). As an illustration, the

extreme level of crisis can cause early and concurrent development of depressive symptoms (Taru et al., 2018). Depressive symptoms affect almost 30% to 70% of people living in areas affected by war (Taru et al., 2018). Meta-analytic evidence of studies published from 1962 to 2004 on the impact of armed conflict on mental health and the prevalence of depression has shown depressive symptoms to have 38% to 41% prevalence (Herrera Rivera et al., 2008). Again, a review of 38 studies conducted in 21 countries on displaced populations showed 5% to 80% cases of depression, 59% cases of anxiety, and post- traumatic stress disorder (PTSD) at 3%-88% (Morina et al., 2018). Similarly, 3% to 30% prevalence was seen in a similar review of displaced persons (Bronstein & Montgomery, 2011).

In Africa, the prevalence of depressive symptoms among IDPs is within the range of 31%-67% (Owoaje et al., 2016). A review of IDPs' problems in Africa puts depressive symptoms as the most common health challenge, at 31%–67% (Owoaje et al., 2016). A review of the health profiles of displaced people in Africa showed that 31%-67% have depressive symptoms (Owoaje et al., 2016). A survey conducted in northwestern Nigeria using 258 IDPs shows (n=154, 59.7%) as having depression (probable), and definite depression (n=42, 16.3%) (Sheikh, Abdulaziz, et al., 2014). The victims of the Boko Haram ethnoreligious crisis in northeastern Nigeria, most of whom are IDPs, suffer depression in camps in Yobe, with 39.3% suffering from probable depression (Nwoga et al., 2018). Similarly, a 62.3% prevalence of depressive symptoms was seen among IDPs in Plateau state, Nigeria, because of an ethnoreligious crisis (Agbir et al., 2016). Again, a 59.7% possible diagnosis of depression among IDPs was seen in Kaduna, northwestern Nigeria after post-election violence (Sheikh, Mohammed, et al., 2014). Depressive symptoms secondary to a traumatic experience is among the mental health challenges facing internally displaced persons. Given the high prevalence of depressive symptoms in IDPs, there is a need to examine its factors, and treatment modalities/strategies /interventions for this target population. Internally displaced persons belong to the world most vulnerable group of people with limited access to their basic rights and essential services and in need of humanitarian assistance (Mooney, 2005; Tajudeen & Adebayo, 2013). Displaced conditions affected their mental health and wellbeing (Owoaje, et al., 2016). The current humanitarian supports provided to these cohorts include treatments for communicable and non-communicable diseases, nutritional supports, sexual and reproductive health services, mental health and psychosocial supports which may involve pharmacological and non-pharmacological strategies (Blanchet et al., 2017; Yatham et al., 2017). Therefore, this study intends to investigate the effects of ACD on outcomes of depressive symptoms and its associated variables of stress and anxiety as part of the research problems.

#### **Chapter 2. Literature Review**

This chapter explores the causes/associated factors of depressive symptoms, conventional management methods of depressive symptoms, associated variables for depressive symptoms, dance intervention for depressive symptoms and psychological health, the study's conceptual framework, study objectives, research gaps, and study significance.

### 2.1. Causes of Depressive Symptoms

### **2.2. Non-modifiable Factors**

### 2.2.1. Environmental factors

As shown in Figure 1, many factors contribute to people's internal displacement, which could be natural or human-made traumatic events (Agbir et al., 2016; Internal Displacement Monitoring Centre, 2019). Traumatic events are unfortunate occurrences with significant physical, physiological, and psychological effects characterised by a state of anxiousness, frightening, traumatic memory and other negative notions in the mind that threaten an individual's life (Akandere & Demir, 2011; Sjöberg et al., 2017). Traumatic events cause displacement of people (internal and external), and are associated with many challenges to our society, both economic and health-related, and very little is known of their impact (Akandere & Demir, 2011; Farhood et al., 2006).

The migration model of contingencies and mental health which was adapted from the stress process model suggested that catastrophic life events (e.g., disasters) before migration, confinement in a camp, and losses, as well as post-migration stresses like poverty, separation from family members, and unemployment threaten mental health (Fenta et al., 2004). Notably, evidence has shown that stressful events associated with postmigration were risk factors for depression (Fenta et al., 2004).

Poverty is one of the factors exposing people to violent situations and crime (Ganepola & Thalaysingam, 2004). As of 2008, 47.5% of people in sub-Saharan Africa live in a state of poverty, and the continent is home to 25% of global chronically poor persons (Smigelsky et al., 2013). It is a well-known fact that poverty leads to conflict and vice versa (Gasana, 2008). Traumatic events occur in an attempt by interested parties: government, rebels, or terrorist organisations - to have access to highly valued commodities – such as diamonds and gold, among others - to sustain their operations (Goodhand, 2003). Developing countries have higher chances of going down a path to "no-exit cycles of violent conflict", which predispose people to traumatic events leading to psychological distress (Douma, 2006; Gasana, 2008). Poverty associated with displacement was identified as a risks factor for depressive symptoms (Fenta et al., 2004).

Violence contributes to the internal displacement and development of depressive symptoms in Africa and politically unstable countries (Krug et al., 2002). The most common is collective violence, which could be social, political, or economic (Krug et al., 2002). The data on the global magnitude of violence is deficient; however, in the year 2000, about 1.6 million people died due to violence, which is equivalent to 28.8%/100,000 (Krug et al., 2002). Conflict situations, like an ethnoreligious crisis, sectarian violence, and communal clashes might play a role in the internal displacement of people (Okoli & Iortyer, 2014; Salawu, 2010). As reported by Mohammed (2017), terrorist attacks constitute 75% of the causes of displacement in Nigeria, while communal/ethnic conflict and religious conflicts account for 17% and 11%, respectively. Natural disasters, such as cyclones,

hurricanes, storms, typhoons, earthquakes, and floods might contribute to people's displacement and subsequent development of mental health problems (depressive symptoms, stress, and anxiety) (Cook et al., 2017; Parker et al., 2016). Natural disasters are associated with the development of depressive symptoms in adults with a 1.73 times possibility (Parker et al., 2016). The adult population tends to have worse health outcomes than children because of pre-existing health conditions that further expose them to morbidity and death (Jia et al., 2010; Ticehurst et al., 1996). The health of IDPs is essential, as evidence has shown that displacement disrupts individual social networks, which aggravates depressive symptoms, and forces people into isolation and subsequent suicidal acts (Internal Displacement Monitoring Centre, 2019; Kinyanda et al., 2013). Stress can be exacerbated by displacement as well, leading to a loss of productivity at work (Internal Displacement Monitoring Centre, 2019). Research has shown that separation from family members secondary to conflict/violence has a negative impact on the subject's psychological wellbeing (Liddell B et al., 2020). It increased their daily stressors, fear, negative emotional responses, and mental health symptoms of stress and depression (Liddell B et al., 2020).

There is a correlation between mental health problems among IDPs and unemployment, low income, low social support, income inequality, low education, and a high prevalence of internalising problems, which in turn affects their quality of life (Marquez, 2016; Siriwardhana et al., 2013). A positive correlation between the development of depressive symptoms and the economic status of the population has been noted (The Mind, 2018). To be specific, it was discovered that being in the bottom (30%) of income distribution in Nigeria is related to the development of depressive symptoms (The Mind, 2018). These factors might contribute to behavioural changes among IDPs, along with increased substance use and abuse, aggression, and higher levels of domestic and sexual violence (Marquez, 2016).

### 2.2.2. Biological factors

Literature evidence has shown that a biological link between stress and depressive symptoms exists (Tafet & Nemeroff, 2016). Stress in the IDP camps along with the individual biological, psychological and genetic predisposition to mental illness might trigger the development of depressive symptoms (Ormel et al., 2013; Owoaje et al., 2016).

### 2.2.3. Sociopolitical factors

Africa is a continent blessed with abundant human and natural resources (Kamoche et al., 2012). However, it faces political instability provoked by religious, cultural, economic, and socio-political factors (Amsalu & Zuping, 2018; Glenn, 2014; Williams, 2017). Other contributing factors are an abuse of power by public officials, youth unemployment, poor resource management, demographic rejuvenation, unfair wealth distribution, endemic corruption in governance, banditry, communal crises, farmers/herders crises, a vast disparity between the rich and poor, a cold war between the world's superpowers, and the global economic meltdown (Akhtar-Danesh & Landeen, 2007; Amsalu & Zuping, 2018). These factors combined have fuelled the ongoing crisis in some quarters of the African continent, leading to displacement and IDPs' subsequent development of depressive symptoms.

### 2.2.4. Lifestyle factors

Evidence in the literature has shown that marital status (unmarried), sense of safety in the camp, gender (more common in female, and being male as a protective factor), income level (no income at all, low-income earners), location (i.e., distance) of camps from home, extra care-giving responsibilities, food security, years of displacement, socioeconomic power shifts/restricted economic opportunities, lack of finance and family support to help them cope, and levels of education, men's chronic alcoholism, were found to be associated with the development of mental health problems (e.g., depressive symptoms) (Amodu et al., 2020; Mujeeb, 2015; Roberts et al., 2009; Salah et al., 2013; Sheikh et al., 2015).

### **2.3. Modifiable Factors**

### 2.3.1. Psycho-behavioural factors

The psychological factors were those emotional and cognitive mechanisms used by the displaced population to cope with life adversity (Kashyap et al., 2021). Poor mental health outcomes (e.g., depressive symptoms) were found to be associated with exposure to traumatic events which are interpersonal such as torture or violence (Steel et al., 2009). Difficulties in regulating emotions in a group of displaced persons are correlated with poor mental health; however, their engagement in specific strategies for cognitive and emotional adaptation such as finding meaning to one's suffering, cognitive reappraisal as well as focusing on their future aspirations might be protective factors (Kashyap et al., 2021). Cognitive factors such as the higher level of perceived control, beliefs about morality (positive), justice, and benevolence were correlated with the positive mental health of the displaced population (Aitcheson et al., 2017; Başoğlu et al., 2005; Hoffman et al., 2018). Overgeneral Memory bias (OGM) which is the subject's tendency to recalls events summary instead of specific occasions was found to be associated with stress symptoms (Kashyap et al., 2021). Further, there is a strong association between the subject's perceived ability to handle stressful life events (self-efficacy), and improvement in mental health (Benight & Bandura, 2004; Morina et al., 2018). Other factors could be low participation in social activities, loneliness, boredom, and inactivity, post-displacement stressors (current and ongoing), experiences of discrimination, loss of resources/capital and safety concerns (Chen et al., 2017; Rasmussen et al., 2010; Schick et al., 2016). Most importantly, depressive symptoms' first onset is commonly seen in those who have experienced major stressful life events (e.g., displacement) for the first time, compared to those who have not (Stroud et al., 2008).

Behavioural factors were found to increase the risk of depressive symptoms among the displaced population, and include increased consumption of alcohol, cigarette smoking, and physical inactivity (Ezard et al., 2011; Horyniak et al., 2016).

Modifiable Factors

### 2.3.2. Traditional belief factors

In some parts of African society, tradition demands women to care for their children and keep the marital bond intact (Amodu et al., 2020). On the other hand, men were responsible for security and financial needs (Almedom et al., 2007). In a displaced condition, women experienced a change in gender roles which might be responsible for depressive symptoms secondary to the increased financial need for food, shelter, and security (Roberts et al., 2008). Those who are married became more anxious and distressed,
and their psychological health might be a direct reflection of their husband's social dysfunction (Hamid & Musa, 2010; Kizza, Hjelmeland, et al., 2012). Apart from their reproductive roles, women in conflict and displacement states take up the responsibility of their family's livelihood especially with restricted movements for men beyond the camps, and limited food aid, or loss of jobs (Cardoso et al., 2016; Logie et al., 2019; Stark et al., 2010). Despite the shift in gender roles, men still wanted to dominate and control their family resources; and were still expected to be in authority with sexual domination over their female partners (Amodu et al., 2020). Women on the other hand might not be prepared to take the role of breadwinners (primary); yet remains as subordinate partners (Amodu et al., 2020). Disagreement might occur in an attempt by women to control or restricts their husband's expenses (Kizza, Hjelmeland, et al., 2012; Kizza, Knizek, et al., 2012). An attempt by men to reestablish their lost masculinity might lead them to spend on leisure activities, extramarital affairs and chronic alcohol (Amodu et al., 2020; Kizza, Hjelmeland, et al., 2012). Collectively, these factors affected women's mental health (Amodu et al., 2020).



Figure 1. Causes/associated factors of Depressive Symptoms

### **2.4.** Associated Variables for Depressive Symptoms

Depressive symptoms, stress, and anxiety are serious public health concerns and are non-psychotic mental health disorders commonly seen in people with traumatic experiences living in low- and middle-income countries (Porter & Haslam, 2005). Early detection is essential in identifying individuals, who could then be offered supportive care that may improve their prognosis (Porter & Haslam, 2005). A correlation exists between depressive symptoms, stress, and anxiety, which has been the concern of researchers and clinicians for a long time. According to the tripartite model proposed by Clark and Watson (1991), depressive symptoms and anxiety share many signs of exalted adverse effects, such as irritability and distress. They are conceptually different; however, substantial overlap exists, making them difficult to differentiate during screening (Tran et al., 2013).

# 2.4.1. Stress

Stress occurs when an individual's body is overwhelmed by either mental, emotional, or psychological factors (Fink, 2016). Chronic stress is strongly correlated to the manifestation of depressive symptoms (Van Praag, 2004). Unmanaged stress could lead to anxiety, which in turn results in depressive symptoms (Hammen, 2005). Coping is a strategy to reduce distress occurring because of negative life experiences. It is a constant change in humans' behavioural and cognitive efforts to deal with challenging situations beyond their resources or capabilities; this could be external or internal demands exceeding the available human resources (Gaudreau, 2018; Lazarus & Folkman, 1987). There are three established elements in the concept of coping; these include the source of stress (stressor event, e.g. internal displacement), the appraisal (cognitive), where the individual evaluates the situation as positive or threatening, relevant, or irrelevant. Individuals simultaneously assess the personal and environmental resources available for them to cope with the situation. Depending on the strategy, coping might reduce or amplify the effects of stress, which determines whether an individual will reduce the range of depressive symptoms (Skinner et al., 2003). Studies on coping have not been consistent, because the correlations between stressor events, available coping styles, and physical or mental health have been complex and unstable.

### 2.4.2. Anxiety

Anxiety is a natural human response to stress, in which subjects develop fear and apprehension (Spielberger, 2013). Anxiety is said to occur if stress exceeds the normal threshold or is unmanaged (Hammen, 2005). Poorly managed anxiety results in a presentation of depressive symptoms (Hammen, 2005). Anxiety and depressive symptoms can coexist; therefore, managing them together is essential (Rebar et al., 2017). However, prolonged or continuous feelings of depressive symptoms and anxiety might signify an established mental health issue (Bond et al., 2020). Anxiety can be a symptom of clinical depression and, most importantly, the treatment of both can be similar (Ironson & Fitch, 2016).

### 2.4.3. Insomnia`

Insomnia is a technical term given to sleep problems (Smith & Trinder, 2001). It is a sleep disturbance leading to sleep insufficiency or difficulties in initiating or maintaining sleep; it might also involve non-restorative sleep leading to daytime impairment and distress (psychological) (Ohayon & Reynolds, 2009; Thorpy, 2012). Insomnia is a common problem among persons displaced by war (Basishvili et al., 2012). There is a link between depressive symptoms and sleep difficulties (Lustberg & Reynolds, 2000). Insomnia appears to be one of the critical features of clinical depression (Jindal & Thase, 2004). It has been projected that 30% of the general population experiences occasional bouts of insomnia, with an estimated 10%-15% suffering from chronic insomnia (Bhatt, 2004; Leger et al., 2000). Sleep problems are associated with adverse health effects; their causes and consequences remain unclear (Basishvili et al., 2012). However, it has predisposing factors, such as the increased use of drugs, being female, changes in the sleep cycle, multiple health problems, and ageing (Riemann & Voderholzer, 2003) Insomnia is associated with the development of depression (Riemann & Voderholzer, 2003). Therefore, it is crucial to evaluate stress, anxiety, and insomnia in people with depressive symptoms.

### **2.5. Traumatic Experiences in Internally Displaced Persons**

Many factors influenced the mental health and wellbeing of the displaced population leading to the development of stress, and its associated effects. Notably, the IDPs were forced to flee their place of abode, separated from their families and friends who might either be killed or displaced to an unknown location, abandoned their properties, businesses/occupations, neighbourhood, and daily routines (Koch & Wieldinger-von der Recke, 2009). Their displaced conditions predisposed them to poverty, food, social support, and medical supplies (Koch & Wieldinger-von der Recke, 2009). Another factor could be the lack of shelter as most of them lives in IDP camps, schools, hospitals, communities or other public institutions. IDPs live with the fear of reprisal attacks & they rely on humanitarian assistance for survival (Koch & Wieldinger-von der Recke, 2009). Further, the fundamental rights of the IDPs were abused as they were paid lower wages compared to the general population.

# 2.6. Conventional Management methods for Depressive Symptoms

Conventionally, public health interventions in settings like IDPs camps and other areas affected by war or conflict/disaster of any form incorporate treatment of communicable and non-communicable diseases, sexual and reproductive health, injury rehabilitation, nutritional supplies, provision of water, sanitation and hygiene, mental health, and psychosocial support (Blanchet et al., 2017). This approach could focus on groups or vulnerable individuals or specific symptom management for those without a mental health diagnosis (Tol et al., 2015). Depressive symptoms and other related traumatic conditions are treated using both pharmacological and non-pharmacological approaches, and the interventions are not only relying on their severity but their types, comorbidities, duration, and many other factors (Blanchet et al., 2017; Yatham et al., 2017).

#### 2.6.1. Pharmacological interventions

Drugs commonly used to treat depressive symptoms include the class dopamine reuptake inhibitors, melatonergic agonists, compounds modulating glutamatergic neurotransmission, and 5-HT reuptake inhibition (5-HT3/5-HT2 receptor antagonism), substance P (neurokinin) receptor antagonists, and corticotropin-releasing factor (CRF) receptor antagonists (Kupfer, 2005). They are, however, generally associated with side effects, high cost, and non-availability in remote locations. IDPs may not have the purchasing power to buy. Therefore, cost-effective non-pharmacological interventions might be necessary options. The cost-effective non-pharmacological interventions refer to those non-drug care approaches that bring the greatest possible treatment effects when the resources and amount spent are considered to be low.

### 2.6.2. Non-pharmacological interventions

The first is psychological health interventions, and the preferred treatment option for depressive symptoms is supportive psychotherapy (Haviland et al., 1988). Approaches adopted globally include psychotherapy, involving educational interventions in stress management, such as Teaching Recovery Techniques (TRT), classroom-based psychosocial intervention programmes, peer education, and structured group educational and health information on stress management (Ager et al., 2011; Karam et al., 2008; Layne et al., 2008). Others include stress management workshops, crisis intervention groups, and writing for recovery (Lange-Nielsen et al., 2012). Activities with a counselling intervention, such as Emotional Freedom Technique (EFT), Cognitive Behavioural Therapy (CBT): trauma-focused CBT, Stress Inoculation Therapy (SIT), Acceptance and Commitment Therapy (ACT) to reduce stress, Stepped Care intervention (STEPCARE), Narrative Exposure Therapy (NET), and Interpersonal Therapy (IPT), were found to be beneficial (Church et al., 2013; de Mello et al., 2005; Everly Jr et al., 2013; Jordans et al., 2016; Uphoff et al., 2020). Second, social investment interventions, such as Economic Empowerment Program (EEP) to strengthen the family-based economy, have been found to reduce depressive symptoms (Gibbs et al., 2020). Third, evidence has shown that physical health interventions, including physical exercise/movement, such as tai chi, yoga and qigong, are beneficial in reducing depressive symptoms (Field et al., 2012). Again, digital health interventions were employed and were found to benefit people with depression and anxiety symptoms (Preschl et al., 2011). Last, nutritional health interventions have been explored clinically and found to improve depressive symptoms (Rechenberg, 2016).

Literature has indicated that uprooted people (i.e., displaced) regularly utilise avoidant (maladaptive) styles for managing terrible circumstances, while the approach (adaptive) strategy is predominantly used for managing life stressors (Geuken, 2013). However, little consideration is given to social networks for advancing coping among IDPs; research evidence has demonstrated the need for sustainable interventions for promoting social networks to facilitate coping (Seguin et al., 2017). Hence, the need for the identification of a cost-effective approach. The most widely recognised coping technique among IDPs includes support seeking behaviour and problem-solving (Seguin et al., 2017). Displaced populaces cope with social, essential, and monetary difficulties

through help from others (including family members, neighbours, community networks, and bilateral agencies, e.g. United Nations organisations; and some work to create income (Davies, 2012; Horn, 2009). Outstandingly, in the African setting, IDPs resort to cutting trees for charcoal creation and mat weaving, as well as running small businesses for survival within the camps (Schownegerdt et al., 1998). With an improved security framework outside the camp and land accessibility for cultivation, some were also involved in agricultural activities (Sliwa & Wiig, 2016). Anecdotal evidence has demonstrated that artistic activities may improve a displaced population's quality of life, but these types of activities are often neglected (Andemicael, 2011). Art could be an instrument for education; it also overlaps into psychosocial issues as a social and behavioural change method (Andemicael, 2011; Stuckey & Nobel, 2010). Today, global policies are geared towards using psychosocial intervention in a humanitarian context (Andemicael, 2011). Everyday artistic activities for displaced people could range from performing arts expressions (narrating stories, dance, drama shows, and music), visual arts expressions (film, drawing, video, painting, photography, and sculpture modelling), literary arts (essays, and poetry), and crafts (traditional handicrafts) (Andemicael, 2011). We, therefore, adopted a performing arts intervention using dancing - a culturally sensitive intervention as one of the intervention components, to determine whether it can promote coping.

The above treatment options were found to be beneficial. However, some of these interventions might require cultural adaptation to be accepted and practised in Africa (Sit et al., 2020). Again, some factors might hinder implementing some non-pharmacological interventions (e.g., psychotherapy) in low resource settings like Africa, due to a lack of experts and necessary resource constraints (Klasen & Crombag, 2013). Most importantly,

literature evidence has shown that brief health education is an approach to help people develop competencies in coping with stress, thus maintaining their mental health (Van Daele et al., 2012). A meta-analysis has demonstrated that brief health education effectively manages stress (d-0.27) (Van Daele et al., 2012), including stress secondary to traumatic experiences (R=.570,  $R^2$ =.324, p<.05), and depression (R=.396,  $R^2$ =.157, p<.05) (Oflaz et al., 2008). Brief health education was also effective for depression symptoms (SMD=.28), anxiety (SMD=.29) with a small effect size. However, both studies didn't assess the quality of evidence, thus making it difficult to conclude the effectiveness of the interventions (Martin et al., 2009). The structure and format of an effective educational intervention include developing groups of different durations using some components such as 1) information model: subjects were provided with the necessary mental health knowledge and care approaches to promote their levels of awareness, and their contributions to management; 2) skills training model: to help subjects develop those behaviours to enhance their capability to effectively manage mental health problems; 3) supportive model: this approach creates support strategy for engaging the subjects, allow them to share their feelings and experiences which in turn helps them improve their emotional coping capabilities, hence our choice of ACD intervention; and 4) the combination of the aforementioned models (i.e., comprehensive model) (Srivastava & Panday, 2016).

### 2.7. Dance Intervention for Depressive Symptoms and Psychological Health

Although there is a wealth of research on physical exercises as highly effective in addressing moderate and mild depression, reduces the risks for developing diseases, improving quality of life, and other long term health benefits (Catalan-Matamoros et al., 2016; Abdin et al., 2016). However, there could be challenges for adults with depression when engaging in physical activity. Notably, physical exercises might be too tiring, and they might also lack time, confidence, knowledge, motivation, or the right environment for practice (Glowacki et al., 2017). Other contributing factors could be low priority, a lack of self-efficacy, not being sporty, an individual's perception of external events, cost, and a lack of facilities (Glowacki et al., 2017), and poor motivation as conventional physical activity is not fun or motivational. These could all be possible reasons why physical activity interventions were correlated with high attrition rates (Tong, & Laranjo, 2018). The reasons for their not performing physical activities might not be because they are lazy, but the activities were not fun to do. Physical activities behaviour needs social support or fun elements to sustain it. We, therefore, add some elements of fun using dance. Dance intervention is not like physical activity, requiring high-intensity physical training (i.e., moderate-to-vigorous intensity) with mostly meaningless movements. The dance incorporates the interplay between music and movement (not necessarily at a high intensity). Dancing is a scheduled form of physical activity where subjects interact socially, it requires subjects to keep in time with their partner, music, and other co-dancers (Quiroga Murcia, et al., 2010). Dance is culturally relevant, and adults might find it motivating and exciting, they are well accepted by all people including the disadvantaged groups (e.g., adults with depression), and adults prefer doing it in a group together with their age mates and other social categories (Dunlop & Beauchamp, 2011; Murrock & Graor, 2016).

Dance intervention has become a common type of non-pharmacological intervention. It is a structured and organised form of physical activity using bodily movement that is attractive and can be adjusted to create social support (Duberg et al., 2016).

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It has been reported as an associate intervention to standard care for depression, stress, and anxiety in the adult population (Pinniger, Thorsteinsson, et al., 2013). It emphasises the creative, expressive, and aesthetic aspects of physical activities for the individuals involved (Duberg et al., 2016).

Dance intervention is easy to learn, inexpensive to conduct (economic), culturally acceptable, and used for religious and sociopolitical events (Borges da Costa, 2012). Literature evidence has shown that improvisational artistic activities like dancing may help reduce stress, compared to non-artistic activities, like walking (Abbott et al., 2013). Circle dance refers to dance movements where subjects move in a circular pattern - representing a symbol with recognised features of totality, completeness, or wholeness – which are considered a form of therapy (i.e., dance movements) (Karampoula & Panhofer, 2018). African Circle Dance (ACD) is an essential element of African traditional cultural heritage where people dance in a circle in response to musical drums (Bokor, 2014; Dils & Albright, 2001). It is used ceremonially to mark life experiences, honour ancestors, community leaders or visitors, present community healing/remedies, and celebrate weddings or rites of passage (Dils & Albright, 2001; Welsh-Asante, 1996). ACD is anticipated to be readily accepted by Africans due to its cultural influence, specificity, and acceptability to individuals with similar beliefs (Diakhate et al., 2013). In general, African dance has been a healing medium to communities and individuals thus conceptualising health and illness to integrate physical, mental and social realms (Monteiro & Wall, 2011). Adopting ACD intervention might be acceptable to the different African ethnic populations due to its cultural relevance as compared to other forms of dance interventions (Abiola, 2019). Research evidence has shown that dance intervention was effective to promote mental health and wellbeing; it was equally accepted by the adults' population with depressive symptoms (Murrock & Graor, 2016). The key dance components and possible mechanism of actions to treat depression or reduce its symptom include: 1) the music which stimulates the release of neurochemicals in the affected areas of the brain leading to emotional adjustment, 2) group cohesion that promotes social interaction, 3) vitalisation which instils hope in the subjects, 4) mirroring-echoing that creates a mirror reaction via behaviour imitation, 5) containment and holding that allows for holding client fears and anxieties, 6) exercises in the dance that stimulates the production of neurochemicals such as dopamine, adrenaline, noradrenaline, and other neurochemicals such as serotonin, and cortisol that provides drugless care for depression (Lechin et al., 1995; Kattenstroth et al., 2010; Sivvas et al., 2015; Martinec, 2018; Karampoula & Panhofer, 2018). We, therefore, developed an ACD programme as a therapeutic modality for African IDPs to purposefully addressed depressive symptoms due to its potential healing effects, and promote physical activity.

### 2.8. Research Gaps

IDPs are living in various countries. The victims often fled their homes without food or official documents, and are often in severe trauma (Kalin, 2008). They are vulnerable to mental health challenges, and in need of humanitarian support and protection (Kalin, 2008). A significant proportion of the IDP population has depressive symptoms (Amusan & Ejoke, 2017). Research reports have shown that people forced to leave their homes exhibit a high prevalence of depressive symptoms (Morina et al., 2018; Owoaje et al., 2016). Interventions such as Cognitive Behavioural Therapy (CBT), Interpersonal psychotherapy (IPT), STEPCARE intervention, Emotional Freedom Technique (EFT), stress management workshops, and structured educational and health information on stress management are known to be effective at reducing depressive symptoms (Ager et al., 2011;

Jordans et al., 2016). Given the high prevalence of depressive symptoms in IDPs, there is a high demand for resources to address people's psychological health needs in IDP camps (Owoaje et al., 2016). However, in resource-deprived Africa, there is a lack of feasible, culturally sensitive interventions (Hanlon et al., 2010). Literature evidence has shown that dance intervention is effective at reducing depressive symptoms (Vankova et al., 2014). ACD is a form of dance that is very cultural and common practice in Africa and it might be accepted by the people. However, there is no empirical evidence examining the effects of psychosocial interventions/programmes using ACD intervention or dance interventions on depressive symptoms among IDPs, despite depression high prevalence. Further, the active ingredients in dance might vary across cultures, and the commonly tested dances interventions were common to the western world. There is the possibility that it might not be accepted by Africans due to its diverse cultures and religious influence. The widely developed western-style dances might be seen as something alien to African culture & tradition, thus rejecting it. Most importantly, IDPs are not familiar with common dances, and transferability might not be possible as acceptability plays an important role in psychosocial interventions. Considering this gap, finding proper effective interventions to treat depressive symptoms among IDPs is significant. Meanwhile, a sound approach that is cost-effective for this cohort in distress is still unknown. Hence, there is an urgent need to develop the ACD Programme and examine its effects on outcomes to help people with depressive symptoms. The impact of the African Circle Dance (ACD) programme is unknown. It is not clear whether adding ACD to brief health educational interventions will be more effective or not. Therefore, this study aimed to examine the effects of ACD on mental health outcomes (i.e., depressive symptoms, stress, anxiety, and insomnia) and coping among IDPs.

# 2.9. Study Significance

This intervention is the first to be conducted in the IDPs population in Africa. It identifies ACD as an alternative approach of care to people living with depressive symptoms, anxiety, stress, insomnia, and coping. This study's outcome contributes to the body of knowledge on 'nursing research and practice' in the following ways: The results of the systematic review study have generated evidence on the effects of dance intervention on depressive symptoms, stress, anxiety, and insomnia. Evidence from this review contributes to informing the ACD dance intervention protocol by identifying appropriate dosage, frequency, and duration. The phase 2 study provides validated tools (Brief COPE, Depression Anxiety Stress Scale, and Insomnia Severity Index) in the Hausa African language for studies on depressive symptoms, stress, anxiety, and coping in Africa. Phase three research informs evidence on the causal relationship between the ACD Programme and outcomes, such as depressive symptoms, stress, insomnia, anxiety, and coping. The development of the ACD programme adds further insights into ACD programme development in terms of knowledge, logistics arrangements, and the resources needed for the effective implementation of the ACD programme.

Clinically, IDP people found ACD to be a helpful programme, due to its cultural relevance and low cost. The ACD programme is beneficial, as it provides insights for improving mental wellbeing. The study results offer insights into ACD programme

development or could facilitate strategic planning for health promotion programmes to reduce stress for people living in IDP camps.

Clinicians and other healthcare professionals may find the results helpful, by adopting them as an adjunct to antidepressants or psychotherapy. Clinicians or policymakers may adapt ACD to create social support, in community service for IDPs in a distressing situation. Lastly, IDPs see their depressive symptoms and stress reduced, and suicide rates might also drop.

## 2.10. Operational Definition of Terms

Ten items of depressive symptoms, anxiety, stress, insomnia, coping, and African circle dance will be operationally defined.

# 2.10.1. Depressive symptoms

Depressive symptoms refer to the clinical indicators of the common or serious psychological imbalances that might lead to sadness or loss of interest in activities an individual enjoyed in the past and are different from major or minor depression (Armstrong et al., 2016). The symptoms include sadness, loss of interest or pleasure, the feeling of tiredness, guilt or low self-worth, depressed mood, and low concentration (Armstrong et al., 2016).

### 2.10.2. Anxiety

Anxiety refers to the human feeling of apprehension or fear, which occurs secondary to stress (Izard, 2013). It is a state of arising from a non-specific and general stimulus perceived as potentially threatening (Dias et al., 2013).

### 2.10.3. Stress

Stress refers to the human response to tension which could be of physical or emotional origin (O'Connor et al., 2021).

#### 2.10.4. Insomnia

Insomnia technically means sleeplessness. It is referred to as a sleep disorder where people report having one or more of the following: 1) difficulties falling asleep at bedtime, or 2) difficulty staying asleep for at least  $\geq$  6 hours or 3) waking up too early, or difficulty in getting back to sleep (Bonnet & Arand, 2009; Chokroverty & Ferini-Strambi, 2017).

# 2.10.5. Coping

Coping is a way of maintaining environmental or internal stressors using cognitive/behavioural, psychological or physical resources (Carpenito, 2017).

#### 2.10.6. Dance

Dance refers to a form of physical activity with a series of rhythmical movements, in a group or individually, in response to the sound of music (LaMothe, 2015).

#### 2.10.7. African circle dance

It is a dance movement commonly practised in African ceremonies, with the subjects moving in a circular pattern in response to musical drum beats (Dils & Albright, 2001), led by a specialist or therapist, and most importantly, it must have an element of music, movement, an interaction between rhythmic movement and facilities for its conduct (Salihu et al., 2021).

## 2.10.8. Internally displaced persons

Refers to a group of people forced to flee from their place of abode to a new location due to disasters (human or natural), but remain in their country of origin (Owoaje et al., 2016).

# 2.10.9. Adults

Refers to persons who have attained the age of 18 or older, who behave responsively with the ability to accomplish mundane but necessary tasks (Canêo & Neirotti, 2017).

# 2.10.10. Mental health

Refers to a state of wellbeing where the individual can actualise his/her potential with the ability to cope with the stresses of life, work fruitfully and productively, thus contributing to the development of his/her community (Galderisi et al., 2015).

# 2.10.11. Quasi-experimental study

Refers to an experimental study design that does not meet all requirements necessary for controlling influences of extraneous variables with no random assignment of participants (Polit & Beck, 2006).

### 2.10.12. Brief health education

Is that educational strategy that was designed consciously to create learning opportunities with some elements of communication that help promotes literacy, a knowledge that provides subjects with necessary skills appropriate for community/personal health (Hou, 2014).

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# 2.11. Chapter Summary

This chapter reviewed the literature on depressive symptoms, causes/associated factors, and associated variables for depressive symptoms, such as stress, anxiety and insomnia. It also covered conventional management methods on depressive symptoms, e.g., drugs, psychotherapy, and their shortcomings. The concept of dance intervention and its effects on depressive symptoms/psychological health were explored. Research gaps - of high demand for psychological health needs, a lack of culturally sensitive cost-effective interventions, and the unknown effects of ACD intervention - were identified, and the study significance was asserted followed by the operational definition of terms. The next chapter will present the conceptual framework for the ACD programme.

#### **Chapter 3. Conceptual Framework for African Circle Dance Programme**

To design a study protocol for the ACD, there is a need to develop a conceptual framework that theoretically explains how the intervention might lead to outcomes (Solomon et al., 2009). The selection of an appropriate theory and model to formulate a conceptual framework relies on the principle of suitability and applicability for clients in IDPs camps. We aimed to identify a relevant theoretical framework for dance intervention leading to a reduction in stress, anxiety, depressive symptoms, insomnia, and an increase in enhanced coping strategies.

The ACD programme was designed based on the Lazarus and Folkman coping theory (Folkman & Lazarus, 1984). The proponents of this theory viewed coping as an individual's efforts to handle external or internal demands appraised to exceed available resources (Lazarus & Folkman, 1987). Stressors, according to this model, are a stimulus causing stress in a subject (Lazarus & Folkman, 1987). To reduce stress, there is a need for continuous appraisal of a situation (Lazarus & Folkman, 1987). An appraisal is the subject's evaluation of the situation related to his/her personal goals, values, and beliefs. This could be primary or secondary (Gellman & Turner, 2013). The primary appraisal tries to determine whether an individual is okay or not (Gellman & Turner, 2013). In contrast, the secondary appraisal examines what can be done to overcome the situation (Gellman & Turner, 2013). Subjects tend to appraise situations as either harmful or potentially harmful, and to consider the available options for controlling them (Gellman & Turner, 2013). Stress could be appraised as harm or loss when damage has already been done, and considered a threat if it was judged that something terrible might happen if action was not taken (Gellman & Turner, 2013). Situations that are appraised as having high significance (personal) with a low ability to control are usually regarded as a threat, while a situation with a higher chance of controllability is considered a challenge (Gellman & Turner, 2013). The situation of the IDP population might be considered a challenge that can be managed with good support. We, therefore, designed an ACD programme, comprised of two parts, i.e., ACD dance intervention and brief health education. The stress-coping theory was used to determine how people can cope with their problems, it explores whether they are more capable to cope with stress or not, and how well they will cope. Dance intervention is also a stress coping strategy (Salihu et al., 2021). Guidelines on stress management developed by the National Health System (NHS) "simple stress busters" were adopted, modified, and integrated into the brief health education component of the ACD programme (Ben-Zur et al., 2019; Reeves et al., 1998). The educational component was designed to teach IDPs the necessary skills needed to enhance or modify their coping skills since they can't cope well due to stress.

## 3.1. Stress, Anxiety, Depression, and Insomnia

Evidence in the literature has shown that a strong relationship exists between chronic stress and depressive symptoms (McGonagle & Kessler, 1990). Unmanaged stress may lead to anxiety, which in turn results in depressive symptoms (Hammen, 2005). Insomnia is a common problem in people affected by war, (Basishvili et al., 2012) and has a link to stressful life events (Figure 2) (Liu et al., 2019).



Figure 2. Relationships between psychological outcomes

### 3.2. Stressor, Coping, and Stress

Folkman and Lazarus' stress and coping theory (1984) considered coping to be the efforts taken by an individual to manage external/internal environmental demands that are appraised as exceeding the available resources (Lazarus & Folkman, 1984). According to this theory's proponents, coping might be a complicated process where an individual is capable or incapable of handling stressful circumstances (Lazarus, 1993). This theory has been used for many decades to guide psychosocial studies (Jaser et al., 2007). The theory viewed stressors as a stimulus responsible for causing stress, which must be reviewed before adopting an appropriate coping strategy (Lazarus & Folkman, 1984). When an individual is confronted with the stressor, he/she tries to determine whether it poses a threat to his/her wellbeing (primary appraisal) (Lazarus & Folkman, 1984). An appraisal is an evaluation of what can be done in the event of a stressful encounter (Zeidner & Endler, 1995). The subject conducts a cognitive appraisal of the stressful events, which is the pre-

requisite of the coping attempts by considering both the environmental (i.e., education, financial resources, and social support network) and psychological factors (self-efficacy, self-esteem) (Zeidner & Endler, 1995). After determining the existence of a threat, an individual tends to cognitively evaluate the process to ascertain what can be done about the relationship between him/her and the environment, especially when the primary appraisal showed that a threat, harm, or challenge exists (secondary appraisal) (Zeidner & Endler, 1995). At this stage, the individual identifies the necessary resources to cope with the threat (secondary assessment) (Lazarus & Folkman, 1984). Thus, trying to deal with the stress caused (coping) (Lazarus & Folkman, 1984). Reappraisal might occur continuously, whenever the situation changes or added information is processed, and also includes re-interpretation of the events as well as the context in which the event occurs in a person's life (Aldwin, 2007).

This cognitive appraisal process is continuous and evaluative (Lazarus & Folkman, 1984). In light of this, after evaluating a stressful encounter, coping attempts to respond to the appraisal process (Lazarus & Folkman, 1984). Coping is regarded as a constant change in the behavioural and cognitive efforts to maintain individual external and internal demands (Verhaeghe et al., 2005). Stress is associated with the development of anxiety, depressive symptoms, and insomnia (Hammen, 2005; Linton, 2004). Coping with stress takes different forms and functions (Figure 3) (Lazarus & Folkman, 1984). Coping can be adaptive or maladaptive (Everly Jr et al., 2013). The adaptive coping style has a strong correlation with reduced stress for a more extended period of time, e.g. with appropriate nutrition, relaxation, and exercise, among others (Everly Jr et al., 2013). Maladaptive coping strategies might result in stress reduction for a short time; however, they can erode

an individual's health in the long run, e.g. interpersonal withdrawal, smoking cigarettes, or abusing substances like drugs or alcohol (Everly & Lating, 2019; Everly Jr et al., 2013). To view it differently, dealing with stress has three common coping actions: problemfocused coping, dysfunction-focused, and emotion-focused coping (Gellman & Turner, 2013). Problem-focused coping is a strategy to address or resolve stressful events (e.g. internal displacement) or modify its sources (e.g. Boko Haram crisis). It also involves meeting human physical needs for survival (e.g. food, clothing, shelter, among others) (Gellman & Turner, 2013). Emotion-focused coping is a stress management strategy that attempts to reduce negative responses (e.g. fear, aggression, depression, or humiliation) occurring secondary to stressors, e.g. distracting self with other activities (Gellman & Turner, 2013). Dysfunction-focused coping refers to a behavioural change approach employing the use of denial (a mechanism that gives you time to adjust), avoidance (avoiding the sources of stress), or self-blame (attributing the source of a stressful event to oneself), or a detrimental approach, such as drug abuse or alcohol (Simpson, 2016). With all of these coping strategies, an individual presents with various outcomes in terms of depression, anxiety, and stress levels. All of these psychological outcomes usually affect sleep quality as well (Lustberg & Reynolds, 2000).



Figure 3. Relationships between stressor, stress and coping

The researchers adopted brief health education and African Circle Dance as the programme's intervention components based on the above-mentioned stress-coping theory and information on the Dance Movement Therapy model. The brief health education component of the ACD programme was structured with the necessary information to help the IDPs' developed emotion, dysfunctional, and problem-focused coping strategies. Consideration was given to the subjects' present psychological health status (i.e., depression, stress, and anxiety), personal factors (i.e., age, gender, marital and financial status, and education level), and environmental factors (e.g., IDPs camps). The IDPs were taught stress management strategies emphasising the provision of support necessary for coping and adjusting to stress, and the positive healthcare behaviours needed for effective coping. To promote dysfunctional coping, subjects were taught to avoid unhealthy habits, such as alcohol, drug abuse, cigarettes, or self-blame. For emotion-focused coping,

cognitive knowledge was provided to IDPs to help equip them with the necessary knowledge on how to take control of their life, being positive at all times, connecting with people, accepting the things they cannot change, and seeking help using the psychosocial unit of their respective residence camp. To promote their problem-focused coping strategies, they were taught to work smarter, help other people, share their problems with others, and have time to relax. Further, supportive resources were provided to them by using leaflets as information, education and communication (IEC) materials developed using locally available content for simple stress busters developed by the National Health System (National Health System, 2017).

In summary, the ACD programme's brief health education component was designed to help equip IDPs with the skills necessary to cope and encourage positive healthcare behaviours using simple stress busters to promote emotion and dysfunction-focused coping strategies (Salihu et al., 2021). Review evidence has shown that brief health education effectively reduces stress and promotes problem/emotion/dysfunction-focused coping strategies (Gilhooly et al., 2016; Salihu et al., 2021; Van Daele et al., 2012). Further, we adopted the use of dance as a stress management strategy. Dance was used in the ACD interventions as a strategy to cope with stressors (Salihu et al., 2021). ACD has two major therapeutic components, which include 1) music, 2) circle dance as described below (Hindi, 2012; Salihu et al., 2021).

## 3.3. Traumatic Experiences and Mental Health Outcomes

Refers to any harmful events that include witnessing or experiencing the threatened or actual death of an individual, sexually related violence, or any serious injury which might potentially be traumatic (Eve & Constance, 2000). Traumatic experiences might occur secondary to disasters that could be natural (e.g., earthquake), or human-caused (e.g., armed conflict or terrorism leading to displacement); or incarceration within the criminal justice system, among others (Saunders & Adams, 2014; Toole & Waldman, 1993). Trauma is associated with emotional, psychological (stress, depressive symptoms, anxiety, and insomnia), spiritual or emotional harm (Figure 4) (Porter & Haslam, 2005).



Figure 4. Relationships between traumatic experiences and mental health

## **3.4. ACD with Coping and Mental Health**

### 3.4.1. ACD Circle dance

A culturally-specific dance is a dance that is peculiar to a particular group or community, and it serves the purpose of transmitting cultures, traditional practices, connectedness, and acceptance (social) (Jain & Brown, 2001). A culturally specific dance involved activities specific to the culture which is influenced or choreographed to their cultural music (Murrock & Gary, 2008). ACD is an intervention that is culturally specific as it varies between one African country and another, and even within one country, it differs from one region to another, and from one tribe to another (Boakye-Ni, 2008; Salihu et al., 2021). Evidence has shown that for a culturally driven intervention to be effective, it has to be consistent with their values, shared beliefs, and those practices specific to their culture (Jain & Brown, 2001). These together served to influence their acceptance and utilisation.

African dance is well adapted in African society, and it is a conduit of individual and community healing that African conceptualise of illness and health integrate social, physical and mental realms, all of which are impacted by trauma (Franklin, 2013; Monteiro & Wall, 2011). ACD is a salient component of the participants' culture (actually African people's culture). It is one of the many dances in Africa incorporating both music and exercises. Although it is not a unique identity for all Africans as it varies between cultures, it is a practice by many based on the tradition they are familiar with. ACD was not originally a therapeutic modality, it has been being practised in ceremonial events (e.g., community healing, rituals, ancestral worship) (Boakye-Ni, 2008; Conner et al., 2021; Salihu et al., 2021). Yet, these events happen once in a while in special events only (e.g. religious, political among others) (Hanna, 1973). Evidence has shown that culturally oriented dance in a group or community is a medium of transmitting traditions, cultures, it connects people and was found to be socially accepted (Boakye-Ni, 2008; Conner et al., 2021; Jain & Brown, 2001). We, therefore, developed ACD interventions with a specific focus on the subject's culture and traditions.

Dancing in a circle is a modest exercise, which is good for an individual's coordination and memory (Hamill et al., 2012; Karampoula & Panhofer, 2018). This type of dance has two unique elements, which are group and the circle (Karampoula & Panhofer,

2018). The basic elements found in circle dance include: 1) group cohesion, 2) vitalisation,3) mirroring-echoing of emotional states, 4) containment and holding, and 5) social integration (Karampoula & Panhofer, 2018).

### 3.4.1.1. Group cohesion

Group dance in a circle has curative (positive) effects on the participants (Karampoula & Panhofer, 2018). In the past, group dance has been used as a medium for social integration, (Dhurup et al., 2010), and relieving isolation (Karampoula & Panhofer, 2018). Group dance promotes exchange through learning from others while dancing in a group (Karampoula & Panhofer, 2018). Being a member of a group dance brings about group cohesiveness, which is also a therapeutic factor (Karampoula & Panhofer, 2018). Group membership together with individuals personal and social identities were identified to results in many positive health outcomes and might act as a buffer to overcoming maladaptive coping behaviours (Alcover et al., 2020; Torgerson, 2018), and being a member of a group relevant to a family, friends or community (e.g., IDPs camp) is associated with greater psychological well-being which is protective against depressive symptoms (Chang et al., 2016; Cruwys et al., 2013).

### 3.4.1.2. Vitalisation

The vitality effect instils hope in the subjects (Karampoula & Panhofer, 2018). Dance movements might improve subject's physical fitness, vitality, and brings people together leading to a reduction of depressive symptoms, stress and insomnia (Sivvas et al., 2015).

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#### 3.4.1.3. Mirroring-echoing state

The mirroring-echoing state creates a mirror reaction through behaviour imitation (Karampoula & Panhofer, 2018). Bräuninger (2012); Wiedenhofer et al. (2017), and Koch (2017), identified echoing and mirroring elements of the Chasian circle dance movement as influencers of individuals' emotional states. These elements, as mentioned above, reduce stress-related symptoms in participants, and psychodynamic orientation might strengthen participants' resilience (physical) and confidence to cope with IDP life (Karampoula & Panhofer, 2018). Mirroring is multiplied in the situation of a group in a circle and is reflected by many people in a group (Karampoula & H. Panhofer, 2018). There was the common feeling of being accepted by others, as the participants see themselves as echoed by others (Karampoula & Panhofer, 2018). Evidence has shown that moving in a group circle might contribute to individuals' betterment through mirroring, physical contact, and containment; it also creates social support and cohesion (Karampoula & Panhofer, 2018; Wiedenhofer et al., 2017). Engagement of subjects by a therapist in a mirroring process, and sometimes echoing qualities of their dance movements might be a reflection of their emotional tones (McGarry & Russo, 2011). Take, for instance, two clients may be dancing using the same steps, but one might engage in stiffer movements while the other might be more fluid, thus reflecting a more anxious or relaxed state of emotions (McGarry & Russo, 2011). During the dance session, the therapist mirrors the subjects' movement quality to relate to them and open empathic dialogue (McGarry & Russo, 2011). Evidence suggested that the mirroring element of dance might strengthen empathy between the specialist, and clients, or between clients, suggesting their correlations in social interactions (regular) (McGarry & Russo, 2011). Improved emotional awareness and a sense of connection with others were achieved

through emotional movements and their mirroring on abused subjects (Mills & Daniluk, 2002). Synchronised movements and music may likely be the unifying factors fostering a sense of unity in the dance group (Mills & Daniluk, 2002). Probably, this may likely enhance coping.

### 3.4.1.4. Containment and holding

The process of containment and holding are important in psychotherapy. The formation of a circle in dance allows for holding clients' anxieties and fears via movements as the specialist assumes the containment function (Karampoula & Panhofer, 2018). Further, the available space for dance provides containment and strict adherence to the time allocated (Meekums, 2002). Holding hands while dancing in a circle was found to have a positive effect on those with severe symptoms of a mental disorder (Beard, 2016). Hand holding may be an active non-threatening process of having withdrawn subjects touch and be touched by others in a holding, contained, and safe environment, thereby strengthening their social skills which might help enhance their coping (Karampoula & Panhofer, 2018). Holding environments which is the subject's experience of being held by caregivers emotionally and physically might provide room for emotional development (Steckley, 2010). Holding environments may offer protective space, creating a sense of being valued and secured; it can create a therapeutic environment that might help clients in containing or holding their painful emotions (Steckley, 2010). It allows subjects to express their internal conflict in a manner that might lead to a higher sense of personal responsibility (Steckley, 2010). However, this element might not be practised in certain contexts due to cultural limitations (Popa & Best, 2010).

#### 3.4.1.5. Social integration

Dance Movement Therapy (DMT) group experience might be responsible for positive global value and cohesive social effects for short-term periods (Bräuninger, 2012). Circularly moving in a group might foster a sense of social connection (Phillips et al., 2004). Some dance associated factors whose connections play a role in its mechanism include playfulness in dance and non-verbal communication, identified as the interactive components of circle dance that instigate self-affective transformation (Bräuninger, 2012; Karampoula & Panhofer, 2018; Wiedenhofer et al., 2017). As a form of non-verbal communication, individuals' beliefs, behaviour, relationships, and emotions were reshaped (Ellis, 2001). Dance is a primary means of communication that might help in the restoration of wellbeing, unlocking memories, and access to imagination and symbolism (Gray, 2015). The playfulness in dance function upgrades the nervous system to interact more effectively with stressors leading to a reduction in stress which might enhance coping (Bräuninger, 2012; Wiedenhofer et al., 2017).

#### 3.4.2. Music

The musical component of dance can cause a distinct emotional state due to the release of neurotransmitters in the affected brain areas (Kattenstroth et al., 2010; Koch & Bräuninger, 2005; Lester et al., 2006). The most compelling evidence supporting this was the outcome of the work of DiLauro et al. (2017), who identified the effects of group music therapy in reducing symptoms of depression in those not responding to cognitive behavioural therapy.

## 3.4.3. ACD as exercise

Despite the above explanation of the mechanism of circle dance on coping with stress, ACD, like any physical exercise, might be associated with the increased production of neurotransmitters, including catecholamines (dopamine, adrenaline, noradrenaline) and other neurochemicals, including serotonin and a gluconeogenic steroid hormone cortisol that provides drugless care for depressive symptoms (Lechin et al., 1995; Martinec, 2018). Norepinephrine affects executive functioning, cognition, intellect, and motivation, which are all needed for social relationships (Moret & Briley, 2011). Physical exercise stimulates the release of a protein called the 'neurotrophic growth factor' responsible for the growth of new nerve cells in the hippocampus, thus making new brain connections (Blumenthal et al., 2007). Theoretical evidence has shown that during exercise, the human body releases endorphins (endorphin hypothesis) that interact with brain receptors (opioid receptors) to lower pain perception in an individual with stress, anxiety, or depressive symptoms (Everly Jr et al., 2013). It is also responsible for sensory and cognitive challenges (Everly Jr et al., 2013).

Dance/music act as a distractor and can occupy an individual's mind with pleasant thoughts that can divert a person's attention from a negative experience by replacing it with positive thoughts (Gall & Breeze, 2008; Nilsson, 2011). Successful coping utilising the effect of dance and music can be reflected by physical health (sleep satisfaction) and psychological well-being (reduced depressive symptoms, perceived stress, and levels of anxiety).

Folkman and Lazarus' coping theory was adopted in this study due to its more comprehensive applications in several creative arts interventions for dealing with stress

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and other emotionally related constructs, such as anxiety and depression (Lazarus & Folkman, 1987; Martin et al., 2018). As shown in Figure 5, the stressors in the IDPs population were environmental factors, political factors, and personal factors (i.e., trauma experience, financial status, personal health condition, marital status, and family support). To facilitate IDP coping, an ACD programme was designed in which a brief health educational intervention might help enhance coping strategies (i.e., problem, emotion, and dysfunctional-focused coping) and reduce stress in IDPs. In contrast, ACD might improve coping with stress, leading to reduced depressive symptoms, anxiety, and insomnia. Evidence has shown that stress is correlated strongly with the development of negative affections (anxiety and depression symptoms) (Daviu et al., 2019). To cope with stress, ACD dancing processes was employed (Salihu et al., 2021). Two major therapeutic components of dance played a role in its effects namely: 1) music, and 2) bodily movements (Dieterich-Hartwell, 2017; Salihu et al., 2021). The interplay between dance and music might stimulate interoception (Salihu et al., 2021). Interoception act as a distractor that shifts subject's attention away from negative experiences thus replaces it with a positive thought (Dieterich-Hartwell, 2017). These attention shifts might be one of the coping strategies (emotion-focused) that enables individuals to cope with stress (Salihu et al., 2021). Eventually, negative emotions and stress might be healed (Dieterich-Hartwell, 2017), and that results in the reduction of anxiety and depressive symptoms, respectively (Salihu et al., 2021).

Research has indicated that dance interventions effectively address mild to moderate intensity depression; however, they are associated with high rates of attrition (Bendel-Rozow, 2020). IDPs usually experienced stress and anxiety due to the loss of a

family member, a history of trauma, and an unfamiliar environment (Salihu et al., 2021). Negative affections, such as anxiety and depression, were strongly correlated with stress (Daviu et al., 2019). An individual usually employs a coping strategy to manage external/internal demands by Organising available resources (Lazarus & Folkman, 1987). When IDPs experience stressors, they choose resources available to reduce their stress; ACD and brief health education were adopted to purposefully promote their wellbeing (psychological) by enhancing their coping strategies in the IDP camp (Goodman, 2017). The contents of brief health education included the knowledge essential for day-to-day stress management, coping skills, and resources available for help within the camps (Salihu et al., 2021). The content of the brief health education is further described in Chapter 4. However, some daily stressors within the IDP camps, such as the inhabitants' economic status, access to healthcare services, availability of an emotional support system, intolerance, violence, and post internal displacement trauma, such as homelessness and helplessness, might impact the outcomes. Hence, the need for an intervention that can help address emotional problems (Salihu et al., 2021).

### 3.4.4. Interoception theory

Interoception refers to the sense of the internal state of our body that enables us to understand what is going on in our body and might include physical sensation relevant to internal organ functions e.g., autonomic nervous activity related to emotions (Dieterich-Hartwell, 2017; Duberg et al., 2020). It is a process by which information (sensory) is transmitted to the brain and other structures in the body, which might be with or without conscious attention (Hindi, 2012). It is a fact that an interplay between music and bodily movements (i.e., tapping to the musical rhythm) in dance stimulates interoception (Hindi, 2012). Interoception might act as a distractor, with the ability to shift an individual's attention away from negative thoughts, thus replacing them with positive feelings (Dieterich-Hartwell, 2017). It was found to play a role in processing emotions, perception formation, and identity (Craig, 2003). The attention shifting may serve as one of the coping strategies (emotion-focused) that allows individuals to cope with stress, thus healing negative emotions (Dieterich-Hartwell, 2017; Salihu et al., 2021).

According to this model, the phenomenon of interoception can play a role in the trauma recovery process. Literature has shown that some regions of the human brain play a part in the process of interoception (Dieterich-Hartwell, 2017). Lateralisation of brain function has demonstrated that the right hemisphere, which is incredibly connected to the autonomic nervous system compared to the left hemisphere, plays a role in evaluating information patterns that could be exteroceptive or interoceptive (Schore, 2001). There was a loop that serves the regulatory function of information processing in the brain, and they are the insular cortex (orbital frontal cortex and anterior cingulate cortex), hypothalamus, and amygdala (Fogel, 2009). To be specific, sensations like sexual behaviours, hunger, thirst, and temperature are regulated by the hypothalamus (Cozolino, 2014). What allows us to perceive emotion and physical sensations are the insula and cingulate cortex's two limbic components (Cozolino, 2014; Van der Kolk, 2006). The basis of "Self as a feeling entity" has its origin from the right anterior insula (Craig, 2003). The amygdala tends to automatically react to perceived danger in the environment, thus stimulating the sensation of fear (Craig, 2003). However, this perceived fear is regulated by the prefrontal cortex (medial); therefore, human physical and emotional arousal might be regulated (Cozolino, 2014; Van der Kolk, 2006). Meanwhile, the frontal cortex (orbital) appraises sensory information as either negative, neutral, or positive (Fogel, 2009). This illustrates the exchange between coordinating, perceiving, and regulating human physical sensations and emotions.

Clinical evidence has shown that individuals who have survived traumatic experiences have trouble adjusting to their bodies or ministering their inner sensations (Van der Kolk, 2006). However, physical symptom manifestations tend to remind them of traumatic experiences, and their focusing on the body may be uncomfortable and mind-boggling (Dieterich-Hartwell, 2017). An interruption in the functioning of the anterior cingulate cortex in trauma survivors has been observed (Lanius et al., 2005). Another compelling piece of evidence was seen in patients with Post-Traumatic Stress Disorder (PTSD), studied for attention to breathing for chronic PTSD and control patients. Activation of the centres responsible for interoception was seen in the control group, with no activation of any self-sensing areas in the PTSD patients (Van der Kolk, 2006). These individuals were found to have the capability of shutting down areas of the brain that transmit emotions and feelings (visceral); they equally lost a sense of self-awareness (Van der Kolk, 2006).

One of the approaches to activating the medial prefrontal cortex and insula is through exercise and meditation (Dieterich-Hartwell, 2017). The critical healing factor here is bringing mindful attention to our bodily sensations and breathing (Farb et al., 2013). The spine gives a corridor through which sensory impulses travel to the human brain, thus making an avenue for processing unconscious interoceptive information into consciousness (Hindi, 2012). Engaging the spine builds up core support by establishing a base for multi-directional movement (Dieterich-Hartwell, 2017). Therefore, the valuable
components needed here include musical sounds, imagery, and metaphor (Hindi, 2012; Meekums, 1999). Symbols and processing metaphors might incite connections among unifying pathways that coordinate our sense of emotional and corporeal self (Cozolino, 2002). Meanwhile, it is crucial that the specialist/therapist takes the lead from the subjects and allows them to display at their own pace, using their insights into when sound and imagery can be introduced (Dieterich-Hartwell, 2017). This can help by stimulating subjects to initiate movements that can be observed, attested, and grounded by the specialist/therapist or mirrored, based on what is beneficial to them (Dieterich-Hartwell, 2017).

Research has shown that dance interventions are effective in reducing stress (physiological or perceived) and negative affect in different populations (Duberg et al., 2020; Vrinceanu et al., 2019). Dance intervention applies the artistic approach to promote restoration and healing in subjects, similar to other therapies (creative arts) (Dieterich-Hartwell, 2017). The doctrine behind Dance Movement Therapy (DMT) was that the human body and mind are two distinct entities that cannot be separated, and body movement was a reflection of an individual's emotional states (Levy, 1988). Changes in the repertoire of dance movements might be responsible for changes seen in subjects' inner landscapes (Dieterich-Hartwell, 2017). This shows that movement is a channel for stimulating brain plasticity and modulating dysregulation of the brainstem (Gray, 2015; Perry, 2006). It can play a role in trauma-informed care by integrating three elements of "movement" as the primary language, "somatic sensations", and "expressive/creative dance" (Gray, 2015). Traumatic thought or memories are stored away, beyond the reach of language, in an image, motor, or sensory form (Gantt & Tinnin, 2009; Perry, 2006). Dance

movements were considered to be one of the primary means of communication, and act as a tool for imagination and symbolism. This can unlock memories and access imagination, thereby supporting the restoration of an individual's wellbeing (Gray, 2015).

Cool back and forth dance movements associated with easy rhythmically adjusted movements performed in a synchronised passion, tapping the musical rhythm with the foot at 80 beats/minutes, might help modulate brainstem dysregulation in a subject, thus providing positive feedback at the amygdala (Dieterich-Hartwell, 2017; Perry, 2006). It is sometimes necessary to up-regulate a hyperarousal state, especially when the subject is shut down or immobilised due to dorsal vagal activation (Porges, 2011). Therefore, introducing dance movements might help with a state shift. Music is an essential component of dance intervention that evokes memories and emotions (Dieterich-Hartwell, 2017). Its multidimensionality might provoke or calm an individual, and it stimulates brain areas responsible for interoception, including the insula, thalamus, cerebellum, orbital frontal and anterior cingulate cortex (Chanda & Levitin, 2013).

# **3.5. Conceptual Framework**

In this study, ACD was chosen as the intervention component as an emotionfocused coping strategy due to 1) its acceptability by the IDP population, 2) it might be applied to individuals with traumatic experiences, and 3) it conforms to the demands for psychological rehabilitation due to its ability to evoke responses (abnormal) (Bendel-Rozow, 2020). Evidence has shown that displaced populations experience a wide range of stressors ranging from migration to a new unsuitable environment to a lack of social support (Eisenbruch, 1991). Again, there is insufficient access to education in displaced settings, which affects individuals coping (Ferris & Winthrop, 2010). It has also been

observed that the displaced population has low participation in physical activities, which might affect their health and wellbeing (Horn, 2009; Wieland et al., 2015). There was no reliable evidence showing dance as a part of IDPs' lives. Again, the lack of organised constructive events and space for recreational activities in displaced settings such as IDP camps hinders people from engaging in traditional dance and sports activities (Horn, 2009). Meanwhile, stress appears when the relationship between the individual and his or her environment is estimated as surpassing his/her coping resources, which might threaten his/her wellbeing (Lazarus, 1993; Lazarus & Folkman, 1984). Further, there were daily stressors of poverty, a lack of access to healthcare services for those in need, unsuitable housing arrangements, social exclusion/isolation with changes in family functions, and the IDPs camp environment further aggravating individual conditions and coping ability (Horn, 2009; Toole & Waldman, 1993). Although, a conceptually different constructs, substantial overlap exists between stress, anxiety, and depressive symptoms (Figure 5) (Tran et al., 2013). A poorly managed stress could lead to depressive symptoms and anxiety, respectively (Hammen, 2005). The government's support, national and multinational non-governmental organisations help IDPs by providing for basic needs (Koch & Weidinger-von der Recke, 2009). However, there was a neglect of their psychological health needs. The Folkman and Lazarus model was adopted for the ACD programme design to enhance individuals' coping strategies (Steffen, 2012).

In summary, it is possible to launch this ACD because of its cultural affiliation, social acceptability by the people, and it needs no professional involvement of medical practitioners. ACD is a potential ritual intervention to manage and reduce depressive symptoms, which may be helpful as its parts are tested and found beneficial in other populations. Figure 5 below shows the conceptual framework between exposure to traumatic events leading to stress, with resultant effects on the development of anxiety, depressive symptoms, and insomnia. The sketch depicts how our intervention component ACD might mediate the effects of stress to reduce depressive symptoms, anxiety, insomnia, and enhance coping strategies. This framework was developed hypothetically using evidence from the literature. It explains how African Circle Dance might help the IDP population.



Figure 5. The Conceptual Framework of the ACD programme

# 3.6. Effect of ACD on Culture and Spiritual Meaning among African People

ACD may help people cope emotionally during the dance by altering participants' physiological states. It also has social, spiritual, and cultural meaning for the people living in Africa, by building social connections. Culturally, dance is a way of portraying their identities, reflecting their histories, values, and traditions. Dance in Africa is beyond entertainment, and conveys emotions, recounts people's stories, and is a means of bringing communities together. Traditional dance in Africa has spiritual applications; it is used to practice rituals or spiritual healings to treat ailments (Monteiro & Wall, 2011). African dance is also used for rites of passage celebrations, e.g., leaving adolescence for adulthood or initiating new members into a particular cultural organisation. The belief here is that mind, body, and community are integrated into the ritual system to transform subjects, facilitate healing, or empower individuals/groups (Monteiro & Wall, 2011).

# 3.7. Justification for PhD Study Phases

Therefore, we hypothesise that IDPs who took part in the ACD are likely to perform better than the control group, with decreased depressive symptoms, anxiety, and stress, and improved sleep quality after eight weeks of intervention. Four objectives were stated to be achieved in the three phases of this study, and they are:

Phase 1

1. To develop an ACD programme (based on the above model/theory and systematic review results for effective education and dosage).

# Phase 2

2. To translate and adapt the instruments measuring the outcomes into the Hausa African language.

Phase 3

3. I) To evaluate the effects of ACD on outcomes of depressive symptoms, stress, anxiety, insomnia, and coping by using a quasi-experimental design.

# **3.8.** The rationale for the quasi-experimental design

The design selection was possibly due to constraints, like subjects contamination in camps because it is a group activity, it is not possible to randomise many camps, and almost impossible to have many clusters as not many camps allow us to conduct studies for security concerns. Other factors could be recruitment issues and difficulties in controlling the subjects in experimental conditions as well as lack of awareness of the intra-cluster correlation (Portney & Watkins, 2009). Randomisation was performed between two campsites only, of which eligible subjects in camp A (Muna Garage camp) were assigned to the ACD programme. In contrast, camp B (Teachers' Village camp) was assigned to be the control group. Using a two-arm research design may yield reliable evidence on the interventional use of African Circle Dance (ACD), and will allow us to investigate the control group, while Muna Garage camp served as the intervention group after a coin flip of the two camps. Despite strict randomisation, the design adhered to RCT as far as possible, to maintain the vigorousness of the research.

# **Chapter 4. Development of African Circle Dance Programme (Phase One)**

This chapter explains developing the ACD intervention protocol using two processes 1) systematic review and meta-analysis, and 2) the Delphi method. The culture of the people sometimes assumes the role of diverting an individual's attention from stressors, a strategy often referred to as "*experiential avoidance*" which could be achieved using different forms of entertainment including dancing. Dance is a recreational physical activity that has been an integral component of the life of the people and their culture. In the studied interventions, dance was used as an important medium for reducing psychological distress, and disability as well as increasing well-being. As a social event, dance provides an opportunity for reminiscing. Therefore, it was considered a component of the ACD programme to help promote the psychological well-being of individuals in distress.

# 4.1. Objectives

- 1. To estimate the effects of the dancing intervention on depressive symptoms, anxiety, stress, and sleep.
- 2. To identify the intervention components of the effective dancing intervention.
- **3.** To develop and validate an ACD intervention programme for adults with depressive symptoms.

# 4.2. Methods

To achieve objectives #1 and #2, we used a systematic review. For objective #3, we used the Delphi method.

# 4.2.1. Methods for the systematic review

#### 4.2.1.1. Protocol registration

The review has been registered with the Centre for Reviews and Dissemination, registration number CRD42019123226. Details can be found in Appendix 1. We followed the PRISMA guideline in designing our review process for transparent reporting.

# 4.2.1.2. Eligibility criteria

# 4.2.1.2.1. Inclusion criteria

- 1. Population: The study recruited all adults and older people (aged 18 or above).
- 2. This age group was selected because of a limited number of dance studies involving children (Gruen, 2018), and the intended protocol will be developed only for adults.
- 3. Intervention: Dance intervention as a whole or as part of the intervention.
- 4. Comparison: The control groups, who received no dance intervention.
- 5. Outcome: The study employed depression symptoms on outcomes.
- 6. Study design: The study employed a randomised controlled trial.

# 4.2.1.2.2. Exclusion criteria

We excluded studies that were a protocol for research, conference papers or thesis, and review papers. They were excluded because we aimed to identify the most rigorous possible evidence. Thesis or dissertations were not peer-reviewed and therefore may be less scientifically rigorous than those that are peer-reviewed and published. To avoid publication bias that might greatly impact the quality of our review, we excluded them. Only studies written in the English language were considered. Other languages were not included due to the unavailability of professional translators, and a lack of time, and funding (Neimann Rasmussen & Montgomery, 2018).

# 4.2.1.3. Information sources

The literature review search was conducted using the five electronic databases of 1) SPORTDiscus, 2) CINAHL, 3) Medline, 4) PsycINFO, and 5) ERIC from 1<sup>st</sup> January 2010 to 24<sup>th</sup> June 2020.

#### 4.2.1.4. Search

Keywords and phrases for the database search were designed using the PICO. We used the following search terms: Depressive symptoms [Depress\* OR mood disorder\* OR depressive symptoms OR affective symptoms\* OR depressive disorders OR adjustment disorder\*] AND Dance intervention [Danc\* OR authentic movement OR movement therap\* OR movement psychotherap OR body psychoth\*] (Appendix 2). The search were limited to: 1)

# 4.2.1.5. Study selection

As shown in Figure 6, all of the database outcomes were exported to the Endnote reference manager, where duplicates were removed. The Endnote find duplicate function, based on the field of author/year, was used. The title/abstract screening that follows this was conducted in line with the eligibility criteria, and manual duplicate removal was done at this stage. Two independent reviewers screened the articles and classified them into three categories: 1) Eligible, 2) not eligible, and 2) unsure. The screening results were compared, and in the event of any disagreement, a third reviewer was invited to resolve it. The eligible and unsure articles underwent full-text screening to determine their eligibility by subject and

title screening. After the full-text screening, and in the presence of any disagreement, a third reviewer was invited to resolve the disagreement during the review process.



Figure 6. Study Selection

#### 4.2.1.6. Data collection process

The data extraction framework is guided by the TIDieR checklist. Precisely, a spreadsheet was designed using the TIDieR checklist items, and used for data extraction after collecting the eligible studies (Appendices 3 and 4). Data items listed in item 4.2.1.7 were extracted and copied to the sheet by two independent reviewers and compared for consistency. The checklist was developed by piloting from the previous studies.

#### *4.2.1.7. Data items*

For the description of the study profile, we extracted author name, year of publication, population age (mean/range), gender, sample size, intervention and comparison groups, outcome variables, their measuring instruments, and their measurement time point.

To estimate the effects of the dancing intervention on depressive symptoms, anxiety, stress and sleep, we extracted the studies' sample size, the variables mean and standard deviation observed at baseline, post-intervention, and follow-up for both the intervention and control groups. This information on the study profile was used to answer objective #1.

The TIDieR list is a tool designed to improve the quality of reporting interventions, and helps identify good reporting elements (Cotterill et al., 2018). The template was adopted to help guide the identification of active dancing intervention components that contribute to improving depressive symptoms, stress, anxiety, and sleep quality. Using the TIDieR checklist, we extracted words using deductive content analysis and put them into categories (Pandey, 2019). These include items #2 (rationale), #3 (materials), #4 (procedure), #5

(interventionist), #6 (mode of delivery), #7 (venue), #8 (dose), and #9 (tailoring). This information was extracted to answer objective #2. These items were extracted because they are related to the development of the ACD intervention protocol.

# 4.2.1.8. Risk of bias in individual studies

PEDro scale was one of the most valid and widely used tools developed for rating randomised controlled trials (de Morton, 2009). The tool was useful in identifying the quality of randomisation, blinding, and reporting of results (de Morton, 2009). To measure the PEDro total score, all items, except for the eligibility criteria, are summed up. The internal validity subscale score was obtained by summing items 2-9. Likewise, statistical reporting is obtained by summing items 10 and 11. PEDro total score can reflect RCT methodological quality and the usefulness of statistical reporting (Tooth et al., 2005). The PEDro scale suggests an excellent rating of 9-10; Good = 6-8; Fair = 4-5; and anything < 4 as poor (Silverman et al., 2012). For this review, only those papers rated as being of fair to excellent quality (i.e. 4 to 10) were considered, to achieve a piece of reliable evidence of moderate to high-level confidence (Guyatt et al., 2008). A PEDro score  $\geq$  3 was previously used by researchers and deemed worthy of inclusion in this review (Zou et al., 2017).

#### 4.2.1.9. Summary of measures and synthesis of results

The Cochrane Handbook guided the reporting of the summary of the measures and results for Systematic Reviews of Interventions (Higgins, 2019). To answer objective #1, the within-group effects on individual outcomes were reported separately using the Hedge's g at T1 and T2. For the between-group effects, the pooled estimates of the treatment effect on outcome variables, i.e. depressive symptoms, anxiety, stress, and sleep, were computed

using a random-effects model based on the mean differences between the intervention and control groups. Admittedly, the conservative random effect model can be used after setting 95% CI if the eligible studies contain significant sources of variations in their design (different population, intervention, and distinct outcome measures) (Perera & Heneghan, 2008).

We performed a meta-analysis if three or more studies were found suitable for inclusion in providing a piece of reliable evidence. Again, we accounted for the studies' heterogeneity by combining them using the random effect meta-analysis (DerSimonian and Laird method) where 95% Confidence Interval (CI), SMD is calculated and the results are presented in a forest plot. We used the random effect model because of the variation in units and design amongst the studies (e.g. different outcome measures and characteristics) (Takeshima et al., 2014). We assessed variability among studies using the I<sup>2</sup>, which will enable us to quantify the inconsistencies or the real differences in effect size (Hak et al., 2018). For clarity, we adopted range per the submission of Higgins and Green (2008), who states that an  $I^2$ of 0-24 should be treated as low heterogeneity, 25-49 as moderate, 50-74 as substantial, while any value 75-100 is regarded as considerable. Again, the Chi-square test was used to assess whether the differences in results were due to chance or not (Higgins & Green, 2008). In the event of significant heterogeneity ( $I^2 > 50$ ), we will use the fixed-effect model and compare the results (Zou et al., 2017). Data were extracted by (DS) and were crosschecked by (RK) and (EMW).

# 4.3. Results

#### 4.3.1. Study selection

As shown in Figure 7, a total of 1,610 results was generated from the five databases and manual searches (n=8), with CINAHL having 78, Medline 71, SPORTDiscus 14, and ERIC 4. The PRISMA framework showed the search results. All articles (n=1,610) from the five databases were exported to Endnote. Duplicates were found by Endnote and removed (n=77). We screened the articles by title and abstract screening (n=1,453). We removed articles for not meeting the eligibility criteria after full-text screening (n=55) (Appendix 5). Twenty-five studies were included in the qualitative synthesis, and five studies had no appropriate data for meta-analysis. None of the studies was rated poor in terms of quality. A total of 20 eligible studies was used for meta-analysis.



Figure 7. PRISMA flow chart

#### 4.3.2. Study characteristics

As shown in Table 1, the identified studies were published from 2011 to 2020. The study population ranged from 18 to 85 years in age. The studies constitute a total of (n= 2,069) subjects with the majority being female (n=1,668, 80.62%). The sampling techniques used in recruiting the subjects were convenience sampling (n=7, 28%), Incidental Non-probability sampling (n=1, 4%), voluntary response sampling (n=4, 16%), with (n=13, 52%) not specifying their techniques. A total of 25 RCT papers was included in the qualitative synthesis. These studies mostly assessed the effects of dancing interventions on Parkinson's disease (n=5, 20%). Also, healthy adults were evaluated for (n=3, 12%). Although the study

design were RCTs, three were of three arms, one 4-arm, while twenty-one were two arms of which three were multicentre, four single-blind, with only one adopting a partial cross-over design. This review's most common type of dance was Dance Movement Therapy (n=7, 28%) and tango (n=5, 20%). Other types of dance include ballroom dance, belly dance, K-pop dance, Turo (Qi dance), square dance, Biodanza dance, Authentic Movement, Sardinian Folk dance, Ngoma dance, Greek traditional dance, music with movement, and aerobic dance. The most common intervention for the control group was the usual care of typical day-to-day activities (n=14, 56%). Another form of dance was used as a control condition in one study (Mavrovouniotis et al., 2016). Some studies used active controls, of physical activities (Pinniger et al., 2019; Rios Romenets et al., 2015). Non-physical activities interventions, such as radiotherapy, meditation, music and social events, support group, mindfulness-based stress reduction, neurodevelopmental treatment and functional electrical stimulation and pharmacotherapy, were equally used (Cheung et al., 2018; Cross et al., 2012; Ho et al., 2016; Lee et al., 2015; Michels et al., 2018; Pinniger et al., 2019).

The outcome of this study are the depression symptoms, stress, anxiety and insomnia and was concurrently assessed. Other outcomes include handgrip strength, rest diastolic blood pressure, arm volume, physical function, satisfaction with life, memory, self-esteem, mindfulness, global cognition, physical and emotional symptoms of distress, and overall distress, coping strategies, stress management strategy, self-image, quality of life, selfefficacy, visual function, activities of daily living, balance/static balance, fatigue, apathy, pain severity, daily functionality, attention and immediate recall, learning/verbal fluency, executive function, mentation and mood, mobility, functional ability/mobility, lower body joint mobility, cohesion, social functioning, happiness, anger-hostility, motor examination, motor disability, loneliness, and positive/negative mood.

We also note several measuring instruments for depression symptoms, such as the Geriatric Depression Scale (GDS), Depression Anxiety Stress Scale (DASS-21), Zung Self-Rating Scale, Beck Depression Inventory (BDI), Profile of Mood States (PMS), Hospital Anxiety Depression Scale (HADS), Brief Symptoms Inventory (BSI), Asberg Depression Rating Scale, Test Anxiety Inventory, Centre for Epidemiological Studies Depression Scale (CES-D), Recognition Memory Test-Faces Inventory (RMTFI), Life Satisfaction Inventory (LSI), 6-min walking test (6MWT), Sphygmomanometer, Handheld Dynamometer (HD), Measuring Tape, Rosenberg Self Esteem Scale, Satisfaction with Life (SWL), Mindful Attention Awareness Scale (MAAS), Coping and Stress Questionnaire (SVF) 120, Body Dysmorphic Disorder Examination (BDDE), Quality of Life Short Form (SF-36), General Self-Efficacy Scale (GSES), Visual Function Questionnaire (VFQ-25), Mini-Mental State Examination (MMSE), Activities of Daily Living (ADL), Instrumental Activities of Daily Living (IADL), Berg Balance Scale (BBS), Modified Barthel Index (MBI), Movement Disorder Society Unified Parkinson's Disease Rating Scale-3 MDS-UPRDS-3), Mini-Balance Evaluation System Test (Mini-BESTest), Montreal Cognitive Assessment (MoCA), Krupp Fatigue Severity Scale (KFSS), Apathy Scale (AS), Parkinson's Disease Questionnaire (PQD-39), Functional and Cognitive Assessment Test (FUCAS), Test of Everyday Attention (TEA), Neuropsychiatric Inventory (NPI), Rey Auditory Verbal Learning Test (RAVLT), Rey Osterrieth Complex Figure Test, Global Deterioration Scale ROCFT), Brief Pain Inventory (BPI), Senior Fitness Tests (SFTs), get-up-and-go test, Group Cohesion Scale (GCS), Breast Scale-36 (BS-36), Rating Anxiety in Dementia total score (RAID), Fluid's Object Memory Evaluation total storage score (FOME\_TS), Fluid's Object Memory Evaluation delayed recall score (FOME\_DR), Digit Span Forward score (DST\_FW), Digit Span Backward score (DST\_BW), Modified Verbal Fluency Test (MVFT), Unified Parkinson's Disease Rating Scale (UPDRS), Parkinson's disease Quality of Life questionnaire (PDQL), Timed Up and Go (TUG), Fatigue Severity Scale (FSS), Visual Analog Fatigue Scale (VAFS), Parkinson's Disease Questionnaire (PDQ-39), Starkstein Apathy Scale (SAS), Parkinson's Disease Fatigue Scale (PFS-16), Back Scratch Test (BST), 11-point Visual Analogue Mood Scale (VAMS-18), and Behavioral and psychological symptoms of dementia (BPSD).

The follow-up period was determined after the termination of the intervention. Only six studies assessed the delayed effects of depression at T2. The follow-up periods were either 10-days, weeks 12, 16, 24, or 56 at the end of the intervention. Further, the follow-up periods at T1 differs with T2 as it ranges from week 6(n=3, 12%), 8(n=3, 12%), 12 (n=8, 32\%), while others could be 1, 2, 3, 10, 16, 24 and 40 and they had (n=1, 4%) each.

# Table 1. Study characteristics

No	Author	Year	Population				Design	Intervention	Comparison	Outcomes		Time (T2)
			Age# Years or range	Gender (Female, %)	Sample size/Sampling methods	Health conditions				Variables	Instruments	(weeks/days)
1	Kaltsatou	2011	56.85	27 (100)	27/NA	Breast Cancer	2-arm RCT	Greek Traditional Dances	Usual care	Depressive symptoms Handgrip strength Rest DBP Arm volume Physical function Life satisfaction	BDI HD Sphyg MT 6MWT LSI	NA
2	Akander e	2011	20-24	60 (50)	120/NA	Healthy	2-arm RCT	DMT	Usual care	Depressive symptoms	BDI	NA
3	Cross	2012	76.5	53 (53)	100/NA	Cognitive impairment	2-arm RCT	DMT	Music only	Depressive symptoms Memory	BDI RMTFI	Ten days
4	Pinniger	2012	18-80	39 (69.1)	66/VRS	Self-reported Depression	3-arm RCT	Tango dance	C1 = Meditation C2 = Usual care	Depressive symptoms Anxiety Stress Self esteem Satisfaction with life Mindfulness	DASS-21-D DASS-21-A DASS-21-S RSES SWL MAAS	NA
5	Brauning er	2012	18-85	147 (90.7)	162/ NA	Stress	2-arm multicentre RCT	DMT	Usual care	Cognitive, physical, and emotional symptoms of distress such as Depressive symptoms, Anxiety, and overall distress Coping & stress management strategy.	BSI SVF Scales 120	24
6	Baptista	2012	18-65	80 (100)	80 /Convenience	Fibromyalgia	2-arm Single blind RCT	Belly dance	Usual care	Depressive symptoms Anxiety Self-image Quality of Life	BDI STAI BDDE SF-36	16
7	Pinniger	2013a	18-73	33 (80.5)	41/ VRS	Affective symptoms	2-arm RCT	Tango dance	Usual care	Depressive symptoms Anxiety Stress	DASS-21-D DASS-21-A DASS-21-S	NA

										Sleep Self-efficacy Satisfaction with life Mindfulness	ISI GSES SWL MAAS	
8	Pinniger	2013b	79.4	17 (100)	17/Convenience	Age related macular degeneration	2-arm RCT	Tango dance	Usual care	Depressive symptoms Visual function Satisfaction with life Self-esteem	GDS VFQ-25 SWL RSES	NA
9	Vankova	2014	83.11	149 (92.0)	162/ Convenience	Depression	2-arm multicenter RCT	DMT	Usual care	Depressive symptoms Global cognition Activities of daily living	GDS MMSE ADL IADL	NA
10	Lee	2015	60.9-73.4	10 (50)	20/NA	Parkinson's Disease	2-arm RCT	K-pop dance	Neurodevelo pmental treatment + Functional electrical stimulation	Depressive symptoms Balance Activities of daily living	BDI BBS MBI	NA
11	Rios Romenet s	2015	63.75	14 (42.4)	33/NA	Parkinson's Disease	2-arm RCT	Tango dance	Self-directed exercise	Depressive symptoms Motor severity Balance Cognition Fatigue Apathy Quality of life	BDI MDS- UPRDS-3 Mini- BESTest MoCA KFSS AS PDQ-39	NA
12	Но	2016	48.9	139 (100)	139/NA	Breast cancer	2-arm Single blind RCT	DMT	Usual care + Radiotherapy	Depressive symptoms Anxiety Stress Sleep Pain severity Quality of Life	HADS PSS PSQI BPI BS-36=Breast scale-36	NA
13	Gao	2016	45-59	50 (100)	50 /NA	Perimenopausal women	2-arm RCT	Square dance	Usual care	Depressive symptoms	ZSRS	NA
14	Mavrovo uniotis	2016	21-55	54 (100)	54/NA	Healthy	2-arm RCT	Aerobic Dance	Greek Dances	Depressive symptoms Anxiety	PMS STAI	NA
15	Lopez- Rodrigue z	2017	18-45	71 (74.7)	95/Convenience	Stress	2-arm RCT	Biodanza dance	Usual care	Depressive symptoms Stress Sleep	CESD PSS PSQI	NA

16	Lazarou	2017	66.8	101 (78.3)	129/NA	Mild cognitive impairment	2-arm RCT	Ballroom dancing	Usual care	Depressive symptoms Global cognition Daily functionality Attention Learning/verbal fluency Memory/executive function Mood	BDI MMSE/MoC A FUCAS TEA 4 RAVLT total/FAS RBMT1 & 2 ROCFTcopy ROCFTdelay NPI	NA
17	Machaco va	2017	83	172 (91.0)	189/NA	Healthy subjects With Functional decline	2-arm RCT	Dance-based program	Usual care	Depressive symptoms Activities of daily living Mobility Global cognition Functional ability	GDS ADL IADL GU> MMSE SFTs	NA
18	Vinesett	2017	47.86	21 (100)	21/ VRS	Stress	2-arm RCT	Ngoma dance	MBSR	Depressive symptoms Anxiety Stress Social functioning Cohesion	CESD DASS-21-A DASS-21-S SF-36 GCS	12
19	Cheung	2018	82.27	125 (75.8)	165/NA	Dementia	3-arm multicentre RCT	MWM	Music only + Social activity	Depressive symptoms Global cognition Anxiety Memory Attention & immediate recall Verbal Fluency	GDS MMSE RAID FOME-TS FOME-DM DST_FW DST_BW MVFT	12
20	Garcia- Diaz	2018	40.37	44 (77.2)	57/INS	Emotional state	2-arm RCT	AM	VM	Depressive symptoms Anxiety Anger-hostility happiness	EVEA	NA
21	Lee	2018	58.9-72.5	24 (58.5)	41/ Convenience	Parkinson's Disease	2-Arm partial crossover RCT	Turo (Qi dance)	Usual care + Pharmacothe rapy	Depressive symptoms Quality of Life Balance Mentation and mood Activities of daily living	BDI PDQL BBS UPDRS MoCA	NA

		1	Fotal	1,668	2,069							
25	Но	2020	79.0	167 (81.9)	204/NA	Dementia	3-arm single blind RCT	DMT	Received regular medication	Depressive symptoms Global cognition Loneliness, Positive/Negative mood Activities of daily living	GDS FOME VAMS-18 IADL BPSD	56 weeks
										Functional mobility Lower body joint mobility	H&Y Scale TUG BST	
24	Solla	2019	67.4	7 (35)	20/ Convenience	Parkinson's Disease	2-arm single blind RCT	Sardinian Folk Dance	Usual care	Depressive symptoms Static balance Global cognition Apathy Fatigue Motor disability	BDI BBS MoCA SAS PFS-16 UPDRS- III/Modified	NA
						symptoms			C2 = exercise C3 = usual care	Stress Sleep Self-efficacy Mindfulness Satisfaction with life	DASS-21-A DASS-21-S ISI GSES MAAS SWL	
23	Pinniger	2019	18-68	57 (89.1)	64 / VRS	Affective	4-arm RCT	Tango dance	C1 =	Fatigue Quality of Life Depressive symptoms	DASS-21-D	NA
										living Motor examination	FSS/ VAFS POD-39	
22	Michels	2018	69.2	7 (53.8)	13/ Convenience	Parkinson's Disease	2-arm RCT	DMT	Support group	Depressive symptoms Mentation and mood Activities of daily	BDI UPDRS TUG	NA
										Motor examination Global cognition		

#mean/range, DASS-21-D=Depression-Anxiety-Stress Scale-21-Depression subscale, DASS-21-A= Depression-Anxiety-Stress Scale-21-Anxiety subscale, DASS-21-S= Depression-Anxiety-Stress Scale-21-Stress subscale, BDI=Beck Depression Inventory, GDS=Geriatric Depression Scale, PMS=Profile of Mood States, CESD=Centre of Epidemiology Study Depression, PSS=Perceived Stress Scale, HADS=Hospital Anxiety Depression Scale, ZRS=Zung Self-Rating Scale, BSI=Brief Symptoms

Inventory, STAI=State Trait Anxiety Inventory, DMT=Dance Movement Therapy, MBSR=Mindfulness-Based Stress Reduction intervention, MWM=Music With Movement; and TAI: Test Anxiety Inventory; EVEA: Escala de Valoración del Estado de Ánimo; VM: Voluntary Movement; and AM: Authentic Movement; PSQI: Pittsburgh Sleep Quality Index; ISI: Insomnia Severity Index; Time (T2)=Follow-up time points; RMTFI=Recognition Memory Test–Faces Inventory; LSI: Life Satisfaction Inventory; 6MWT=6-min walking test; Sphyg=Sphygmomanometer; HD: Handheld Dynamometer; MT=Measuring Tape; Rest DBP: Rest Diastolic Blood Pressure; RSES=Rosenberg Self Esteem Scale; SWL=Satisfaction with Life; MAAS=Mindful Attention Awareness Scale; VRS=Voluntary response sampling; SVF Scales 120=Coping and Stress Questionnaire (SVF) 120; BDDE= Body Dysmorphic Disorder Examination; SF-36: Quality of Life Short Form; GSES=General Self-Efficacy Scale; VFQ-25= Visual Function Questionnaire; MMSE=Mini-Mental State Examination; ADL= Activities of Daily Living; IADL= Instrumental Activities of Daily Living; BBS=Berg Balance Scale; MBI=Modified Barthel Index; MDS-UPRDS-3=Movement Disorder Society Unified Parkinson's Disease Rating Scale-3; Mini-BESTest=Mini-Balance Evaluation System Test; MoCA=Montreal Cognitive Assessment; KFSS=Krupp Fatigue Severity Scale; AS=Apathy Scale; PDQ-39=Parkinson's Disease Questionnaire; FUCAS=Functional and Cognitive Assessment Test; TEA=Test of Everyday Attention; NPI=Neuropsychiatric Inventory; RAVLT=Rey Auditory Verbal Learning Test; ROCFT=Rey Osterrieth Complex Figure Test; GDS=Global Deterioration Scale; BPI=Brief Pain Inventory; STS=Senior Fitness Tests; GU&GT=get-up-and-go test; GCS=Group Cohesion Scale; BS-36=Breast Scale-36; RAID= Rating Anxiety in Dementia total score; FOME\_TS=Fluid's Object Memory Evaluation delayed recall score; DST\_FW=Digit Span Forward score; DST\_BW=Digit Span Backward score; MVFT=Modified Verbal Fluency Test; INS=Incidental Non-probability Sampling; UPDRS=Unified Parkinson's Disease Rating Scale; PDQ-39=Parkin

# 4.3.3. Risk of bias within studies

As shown in Table 2, all eligible studies (n=25) were evaluated for risk of bias. The PEDro total scores of the eligible articles (n=25) ranged from 4 to 7. Fourteen articles (56%) were rated as good, while 11 (44%) were of fair quality. None of the studies blinded the participants or therapists. Only nine studies (36%) blinded the assessors. A more than 15% dropout rate was reported in 16 studies (64%), with only 11 analysing the data using intention to treat.

Authors	Year	Eligibility	Random allocation	Concealed	Baseline similarity	Blinding (P)	Blinding (T)	Blinding (A)	Dropout	ITT	Group comparison	PMVD	Total score	Internal validity	Subscale	Quality rating
Kaltsatou	2011	Yes	Yes	No	No	No	No	No	Yes	No	Yes	Yes	4/10	2/8	2	Fair
Akandere	2011	No	Yes	No	No	No	No	No	Yes	No	Yes	Yes	4/10	2/8	2	Fair
Cross	2012	Yes	Yes	No	Yes	No	No	No	No	Yes	Yes	Yes	5/10	3/8	2	Fair
Pinniger	2012	Yes	Yes	No	Yes	No	No	No	No	No	Yes	Yes	4/10	2/8	2	Fair
Brauninger	2012	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	7/10	5/8	2	Good
Baptista	2012	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	8/10	6/8	2	Good
Pinniger	2013a	Yes	Yes	No	Yes	No	No	No	Yes	No	Yes	Yes	5/10	3/8	2	Fair
Pinniger	2013b	Yes	Yes	No	Yes	No	No	No	Yes	Yes	Yes	Yes	6/10	3/8	2	Good
Vankova	2014	Yes	Yes	No	Yes	No	No	Yes	Yes	No	Yes	Yes	6/10	4/8	2	Good
Lee	2015	No	Yes	No	Yes	No	No	No	No	No	Yes	Yes	4/10	2/8	2	Fair
<b>Rios Romenets</b>	2015	Yes	Yes	No	Yes	No	No	No	Yes	yes	Yes	Yes	6/10	4/8	2	Good
Но	2016	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	7/10	5/8	2	Good
Gao	2016	Yes	Yes	No	Yes	No	No	No	No	No	Yes	Yes	4/10	2/8	2	Fair
Mavrovouniotis	2016	No	Yes	No	Yes	No	No	No	Yes	Yes	Yes	Yes	6/10	3/8	2	Good
Lopez-Rodriguez	2017	Yes	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	5/10	3/8	2	Fair
Lazarou	2017	No	Yes	Yes	Yes	No	No	Yes	No	No	Yes	Yes	6/10	4/8	2	Good
Machacova	2017	Yes	Yes	No	Yes	No	No	Yes	Yes	No	Yes	Yes	6/10	4/8	2	Good
Vinesett	2017	Yes	Yes	No	Yes	No	No	No	Yes	Yes	Yes	Yes	6/10	4/8	2	Good
Cheung	2018	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	6/10	6/8	2	Good
Garcia-Diaz	2018	Yes	Yes	No	Yes	No	No	No	No	No	Yes	Yes	4/10	1/8	2	Fair
Lee	2018	Yes	Yes	No	Yes	No	No	Yes	No	Yes	Yes	Yes	6/10	4/8	2	Good
Michels	2018	Yes	Yes	No	No	No	No	Yes	Yes	No	No	Yes	4/10	3/8	1	Fair
Pinniger	2019	yes	yes	No	Yes	No	No	No	No	No	Yes	Yes	4/10	2/8	2	Fair
Solla	2019	Yes	Yes	No	Yes	No	No	Yes	Yes	No	Yes	Yes	6/10	4/8	2	Good
	2020	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	7/10	5/8	2	Good

Table 2. Risk of Bias in individual studies using the PEDro Scale

Note: Each item scored as either Yes = present or No = absent. All items except eligibility criteria specified 'are summed to create a PEDro total score: items 2-9 are summed to form the internal validity

subscale; items 10 and 11 are summed to form the statistical reporting subscale. Furthermore, the higher the score, the better the methodological quality and report. P = Participants, T = Therapist, A = Assessors, PMVD = Point measures and variability data.

# 4.4. Results of individual studies

# 4.4.1. Objective #1: Within effects of individual studies

The number of studies used for estimating the effect sizes were 19, 5, 4, and 4 for depressive symptoms, anxiety, stress, and insomnia, respectively. As shown in Table 3, the effect size (Hedge's G) reporting the within-group effects of dance on depressive symptoms for the intervention group at T1 was in a range of -.03 to 3.5, anxiety -.03 to 1.0, stress .4 to 1.3, and insomnia .1 to .8, respectively. At T2, the estimates of effect sizes included four studies for depressive symptoms, three for anxiety with stress and insomnia having two each. The effect for depressive symptoms was in a range of .3 to 1.5, anxiety .4 to 1.3, .8 to 1.8, and insomnia .4 to .9, respectively. The within-group Hedge's G was assessed to evaluate the progress made by the study subjects in the dancing groups of individual studies, and their sustained effects at follow-ups. The effects would supply evidence supporting the notion that dance intervention might be effective, and the procedures for implementing the interventions might be satisfactory.

				Effect	size-Within	group
				(Hedge'	s G)	
No.	Author	Year	Variables	T1	T2	
1	Kaltsatou et al.,	2011	Depression	3.5	NA	
2	Akandere & Demir	2011		.3	NA	
3	Cross	2012		1.4	.9	
4	Pinniger	2012		.6	NA	
5	Bräuninger	2012		.3	.3	
6	Baptista	2012		NA	NA	
7	Pinniger	2013a		1.2	.9	
8	Pinniger	2013b		NA	NA	
9	Vankova	2014		.2	NA	
10	Lee	2015		1.4	NA	
11	Romenets	2015		.03	NA	
12	Но	2016		<.1	NA	

13	Gao	2016		1.6	NA
14	Mavrovouniotis	2016		.3	NA
15	Lopez-Rodriguez	2017		1.1	NA
16	Lazarou	2017		.6	NA
17	Machacova	2017		NA	NA
18	Vinesett	2017		NA	NA
19	Cheung	2018		.5	NA
20	García-Díaz	2018		NA	NA
21	Lee	2018		03	NA
22	Michel's	2018		2	NA
23	Pinniger	2019		1.3	1.5
24	Solla	2019		2.2	NA
25	Но	2020		NA	NA
26	Pinniger	2012	Anxiety	.7	NA
27	Baptista	2012		NA	NA
28	Bräuninger	2012		.5	.4
29	Pinniger	2013a		.7	.9
30	Но	2016		03	NA
31	Pinniger	2019		1.0	1.3
32	Pinniger	2012	Stress	.8	NA
33	Pinniger	2013		1.0	.8
34	Lopez-Rodriguez	2017		.4	NA
35	Pinniger	2019		1.3	1.8
36	Pinniger	2013a	Insomnia	.8	.4
37	Но	2016		.1	NA
38	Lopez-Rodriguez	2017		.3	NA
39	Pinniger	2019		.6	.9

T1: post-intervention, T2: follow-up.

# 4.4.2. Objective #1: Between-group effect on depressive symptoms

Figure 8 shows 19 studies that evaluate the effect of dance on depressive symptoms. A total population of 1,455 (740 in the experimental group and 715 in the control group) was included in this analysis. The overall effects appear to be statistically significant (p<.001). A pooled estimate of SMD of -.44(95% CI -.61, -.26) was achieved. However, the pooled studies have a moderate heterogeneity index (Chi-square 46.12; p-value <.01;  $I^2 = 59\%$ ).

	Experimental				ontrol		:	Std. Mean Difference	Std. Mean Difference			
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% Cl	IV, Random, 95% Cl			
Akandere 2011	13.9	5.6	60	17.5	7.7	60	6.7%	-0.53 [-0.90, -0.17]	(			
Baptista 2012	20.2	13.2	40	23.5	11.5	40	5.9%	-0.26 [-0.70, 0.18]				
Bräuninger 2012	0.7	0.8	84	0.8	0.7	54	7.0%	-0.13 [-0.47, 0.21]				
Cheung 2018	4.2	2.9	58	5.4	3.1	53	6.6%	-0.40 [-0.77, -0.02]				
Cross 2012	10.5	4.5	50	14.5	3.9	50	6.2%	-0.94 [-1.36, -0.53]				
Gao 2016	0.6	0.1	26	0.6	0.1	24	4.9%	0.00 [-0.55, 0.55]				
Ho 2016	5.5	3.7	66	5.5	3.4	64	7.0%	0.00 [-0.34, 0.34]	<del></del>			
Kaltsatou 2011	10.6	1.7	14	17.4	7.7	13	3.0%	-1.20 [-2.04, -0.37]	←			
Lazarou 2017	1.3	1.7	66	2.2	2	63	6.9%	-0.48 [-0.83, -0.13]				
Lee 2015	18.2	2	10	20.6	1.5	10	2.4%	-1.30 [-2.29, -0.32]	←			
Lee 2018	11.4	7.6	25	16	7.9	16	4.2%	-0.58 [-1.23, 0.06]				
Lopez-Rodriguez 2017	12.4	8.4	42	17.6	9.8	53	6.2%	-0.56 [-0.97, -0.15]				
Mavrovouniotis 2016	1.9	4.2	27	2.3	5.1	27	5.1%	-0.08 [-0.62, 0.45]				
Michels 2018	10.9	5.5	9	5.5	2.4	4	1.6%	1.03 [-0.24, 2.31]	<b></b>			
Pinniger 2012	8.8	9.6	21	16.9	9.7	29	4.6%	-0.83 [-1.41, -0.24]				
Pinniger 2013a	5.9	4.3	20	9.7	5.1	21	4.2%	-0.79 [-1.43, -0.15]				
Pinniger 2019	6.3	3.2	18	9.4	6.3	23	4.3%	-0.59 [-1.22, 0.04]				
Romenets 2015	7.3	4.4	15	7.7	7.2	18	3.9%	-0.06 [-0.75, 0.62]				
Solla 2019	7.6	2.1	10	13.8	4.2	10	2.1%	-1.79 [-2.86, -0.72]	←			
Vankova 2014	5	3.3	79	5.3	3.3	83	7.3%	-0.09 [-0.40, 0.22]				
Total (95% CI)			740			715	100.0%	-0.44 [-0.61, -0.26]	◆			
Heterogeneity: Tau <sup>2</sup> = 0.0	)8; Chi <b>²</b> =	= 46.12	2. df = 1	9 (P = 0	.0005	); <b>i</b> ² = 5	9%					
Test for overall effect: Z =	4.87 (P	< 0.00	001)			-			-2 -1 U 1 2			
									Favours (Dancing) Favours (control)			

Figure 8. Forest plot of the comparison: Dancing intervention vs Control group: Depressive symptoms

# 4.4.3. Objective #1: Between-group effect on anxiety

To examine the effect of dance intervention on anxiety, a total of six trials was included, with 480 participants (249 experimental and 231 control arm). Figure 9 shows that dance intervention has effectively reduced anxiety with the overall effect of SMD - .27(95% CI -.53, -.01; p <.05). However, there seems to be moderate heterogeneity amongst the included studies ( $I^2$ =45%, p=.10), which signifies some degree of inconsistency.

	Experimental						Std. Mean Difference			Std. Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% Cl		IV, Random, 95% Cl
Pinniger 2012	5.7	7.1	21	11.9	10	29	13.0%	-0.69 [-1.26, -0.11]		
Baptista 2012	50.1	10	40	54.8	10.5	40	17.8%	-0.45 [-0.90, -0.01]		
Pinniger 2019	4.9	2.9	18	6.7	5.6	23	11.8%	-0.38 [-1.00, 0.24]		
Bräuninger 2012	0.7	0.6	84	1	1.3	54	22.7%	-0.32 [-0.66, 0.03]		
Pinniger 2013a	5.2	4.8	20	6.2	5.2	21	12.0%	-0.20 [-0.81, 0.42]		
Ho 2016	6.3	3.8	66	5.7	3	64	22.7%	0.17 [-0.17, 0.52]		
Total (95% CI)			249			231	<b>100.0</b> %	-0.27 [-0.53, -0.01]		•
Heterogeneity: Tau <sup>2</sup> = Test for overall effect	= 0.05; Cł : Z = 2.07	ni² = 9 (P = 0	.12, df= ).04)		-2	-1 0 1 2 Favours [Dancing] Favours [control]				

Figure 9. Forest plot of the comparison: Dancing intervention vs Control group: Anxiety

# 4.4.4. Objective #1: Between-group effect on stress

Five studies assessed the effects of dance intervention on stress with a total sample of 357 subjects (167 experimental and 190 control groups). Dance intervention appears to have a significant effect on stress reduction. Figure 10 shows evidence of the attainment of an overall effect of (p<.01), which is statistically significant. The pooled SMD estimate was -.42(95% CI -.63, -.21), and the results were consistent across studies ( $I^2=0\%$ , p=.54).

Experimental					ontro			Std. Mean Difference	Std. Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% Cl	IV, Random, 95% Cl
Ho 2016	18.4	4.6	66	19.5	4	64	37.5%	-0.25 [-0.60, 0.09]	-8-
Lopez-Rodriguez 2017	21.1	10.9	42	25.5	9.2	53	26.6%	-0.44 [-0.85, -0.03]	
Pinniger 2012	12.5	7.5	21	19.9	9,9	29	13.0%	-0.81 [-1.40, -0.23]	
Pinniger 2013a	8.3	4.5	20	11.4	5.5	21	11.3%	-0.60 [-1.23, 0.02]	
Pinniger 2019	8.6	3.6	18	10	5.5	23	11.6%	-0.29 [-0.91, 0.33]	
Total (95% CI)			167			190	100.0%	-0.42 [-0.63, -0.21]	•
Heterogeneity: Tau <sup>2</sup> = 0.1	00; Chi²:	= 3.12,	df = 4 (	(P = 0.5	4);  ²:	= 0%		-2	
Test for overall effect: Z =	= 3.88 (P	= 0.00	01)		-2	Favours (Dancing) Favours (control)			

Figure 10. Forest plot of comparison: Dancing intervention vs Control group: Stress

# 4.4.5. Objective #1: Between-group effect on sleep

Four studies assessed the effect of dance intervention on sleep, with a total sample of 307 subjects (146 experimental and 161 control). Figure 11 evidence has shown that dance intervention has no significant effect on sleep in individuals with affective symptoms, stress, and breast cancer. The pooled estimate of SMD was -.13 (95% CI -.35, .10; p >.05) which is trivial, and the pooled studies seem to be consistent (Chi-square = .85; df = 3;  $I^2 = 0\%$ ).

	Expe	rimen	tal	Control				Std. Mean Difference	Std. Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% Cl	IV, Random, 95% Cl
Ho 2016	7.1	3.9	66	7.5	4.2	64	42.7%	-0.10 [-0.44, 0.25]	
Lopez-Rodriguez 2017	5.6	2.7	42	5.9	3.2	53	30.8%	-0.10 [-0.50, 0.31]	
Pinniger 2013a	10.1	7.3	20	12.8	6.2	21	13.2%	-0.39 [-1.01, 0.23]	
Pinniger 2019	11.1	5.1	18	11.3	7.9	23	13.3%	-0.03 [-0.65, 0.59]	
Total (95% CI)			146			161	100.0%	-0.13 [-0.35, 0.10]	•
Heterogeneity: Tau <sup>z</sup> = 0.00; Chi <sup>z</sup> = 0.85, df = 3 (P = 0.84); i <sup>z</sup> = 0%								-2	
Test for overall effect: Z = 1.12 (P = 0.26)								-	Favours (Dancing) Favours (Control)

Figure 11. Forest plot of comparison: Dance intervention vs Control group: Sleep

# 4.4.6. Objective #2: Development and validation of an ACD intervention programme for adults with depressive symptoms.

# *4.4.6.1.Item #2 Rationale*

Five themes described the rationale for dance intervention. As shown in Table 4, dance is an attractive, non-pharmacological intervention that combines 1) physical activity (low exercise), 2) music, sensory stimulation 3) social interactions and 4) dance as a medium of communication.

# 4.4.6.1.1. Physical activity

Dance as a physical activity intervention equally incorporates the individual's cultural, cognitive, and emotional aspects involving interactions socially and musically, involving sensory stimulation and motor function (Akandere & Demir, 2011; Machacova et al., 2017). It is a beneficial physical activity that improves individual physical wellbeing, psychological functioning (depression, anxiety, and stress), life satisfaction, quality of life/sleep, fatigue, disability, and cardiovascular fitness in both clinical and non-clinical samples (Akandere & Demir, 2011; Bräuninger, 2012; Kaltsatou et al., 2011; López-Rodríguez et al., 2017; Mavrovouniotis et al., 2016; Pinniger et al., 2012; Pinniger, Brown, et al., 2013; Vankova et al., 2014). Dance enables participants to show their energy (Akandere & Demir, 2011). Dance indirectly promotes psychological wellbeing by requiring individuals to concentrate on learning new skills (Pinniger et al., 2012). Music with movement intervention is the best approach for developing and reactivating archaic expressive and relational abilities to promote well-being and improve new learning strategies (Cheung et al., 2018). The fluid movements in dance might help address the postural instability, rigidity, and bradykinesia associated with Parkinson's disease (Michels et al., 2018). Aerobic exercise is equally effective at treating stress, fibromyalgia, pain, and climacteric symptoms (Baptista et al., 2012; Gao et al., 2016). People with a history of exercise have been found to enjoy a positive mood, compared to sedentary individuals (Gao et al., 2016).

Partnered dance interventions were associated with positive effects on the subject's emotional state, compared to movement without a partner or exercise without music (Pinniger, Thorsteinsson, et al., 2013). Dance can mediate the subject's emotions by

improving interpersonal relationships. Dance is an effective approach for cognitive and physical impairments, due to incorporating motor and physical skills and engaging the subject's cognitive functions, which might include memory and perception (Machacova et al., 2017).

Dance exercise promotes neurogenesis, thus preventing neurodegeneration and improving balance, cognitive function, independence, and an individual's physical state (Lee et al., 2015). Appropriate intensity exercise can also promote the production of the neurochemical dopamine and improve motor disturbances in a subject (Rios Romenets et al., 2015). The motor effects of dance rhythm might explain its therapeutic and symbolic functions (Solla et al., 2019).

Dance can stimulate the limbic system and cause emotional involvement that binds an individual's subjective experience with objective, dynamic experiences (Solla et al., 2019). Authentic movement is a creative process of developing the inner self in the mystical and transpersonal world for spiritual development (García-Díaz, 2018; Solla et al., 2019). The mover in the authentic movements centres his/her attention and tries to identify physical impulses, feelings, mental images, emotions, or sensory experiences (García-Díaz, 2018). The individual does so by expressing these things through movement (García-Díaz, 2018).

# 4.4.6.1.2. Music

The music component was previously clinically beneficial to individuals in terms of images, memories, and emotional recall (Cross et al., 2012). Preferential delivery of music is safer than pharmacotherapeutic agents, with fewer adverse effects (Cheung et al., 2018). The memories are positive, and therefore, music tends to have therapeutic effects (Cross et al., 2012). Music also affects the brain's ventral tegmental area associated with the release of dopamine – therefore, music can be explained as a pleasurable stimulus (Rios Romenets et al., 2015). The association between music and the release of dopamine are correlated to establishing and maintaining relationships (Rios Romenets et al., 2015).

#### 4.4.6.1.3. Sensory stimulations

Exercise has been found to stimulate neurogenesis (Lee et al., 2015). Dance exposes subjects to music and acoustic stimulation (Lazarou et al., 2017). The spatial stimulation could be from environmental landmarks, directional or translational inputs, and is responsible for stimulating hippocampal cells responsible for spatial recognition (Lazarou et al., 2017). Dance intervention utilises the resources in the frontal lobe, and its movement is based on visual integration and path tracking (Ho et al., 2020). These components might activate the hippocampal and entorhinal networks related to a subject's spatial memory (Ho et al., 2020). Dance interventions stimulate the human vestibular system and create a conscious state, thereby positively impacting the strength and fitness of an individual's cardiac and vascular systems (Bräuninger, 2012).

#### 4.4.6.1.4. Social interactions

Dance is a form of workout that is appealing (Solla et al., 2019). It has been established that social connectivity might help relieve pressure and tension (Lazarou et al., 2017). Dancing socially was previously found to effectively reconstruct severity, promote a sense of empowerment, and redevelop the social senses (Lee et al., 2018). Dance promotes reminiscences through its sociological, psychological, and physiological components (Vankova et al., 2014). Group dance enables subjects to support each other socially, with shared concerns, emotions, and strategies for coping (Ho et al., 2016). It was

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effective when undertaken under the guidance of a dance teacher or spiritual leader to create social support and address a problematic situation, healing (mind and body) and psychodynamic growth (Vinesett et al., 2017). These effects were further enhanced due to the social nature of dance classes and a supportive environment (Solla et al., 2019; Vinesett et al., 2017). The witness to dance observes what happens to the mover; he/she holds space for supporting the dancers in terms of recognition, communication, and expressing their feelings (García-Díaz, 2018). It has been found that observing others performing the act of dancing encourages participation (Cross et al., 2012). Therefore, combining exercise with music might increase motivation, enjoyability, and accessibility, leading to improved mood and cognition (Rios Romenets et al., 2015).

Dance is a constructive way of solving certain life problems, improving self-esteem and body image (Bräuninger, 2012). It has been found to positively influence social relationships, and enhance social skills, perception of self-efficacy, and self-mastery (Gao et al., 2016; López-Rodríguez et al., 2017; Mavrovouniotis et al., 2016). Having the opportunity to express emotions socially is associated with increased self-efficacy and reduced states of emotion (Pinniger, Brown, et al., 2013b).

# 4.4.6.1.5. Dance as a medium of communication

Dance interventions emphasise the relationship between mind and body in such a way that an individual can express his or her mind via dance (Ho et al., 2016). Dance interventions incorporate music and movement to communicate differing themes symbolically, using a non-verbal medium (Cross et al., 2012). Dance body language allows subjects to speak their subconscious mind, making it an effective tool for communication (Akandere & Demir, 2011). Dance enables individuals to express themselves, reconnect
and accept their bodies, cope with fear and depression symptoms, rebuild self-confidence, and strengthen their resources (Ho et al., 2016). Dance allows subjects to process and overcome frightening events cognitively and allows for self-feeling and problem analysis (Bräuninger, 2012).

#### 4.4.6.2. Item #2 theories

As shown in Table 4, most of the studies (n=23, 92%) lacked a theoretical underpinning for their interventions (item #2). On the contrary, three studies reported using the Person-Environment fit (P–E fit) Theory and Progressively Lowered Stress Threshold (PLST) model (Cheung et al., 2018). Others were the Theory of Embodiment and Holistic model of Psychological Stress Adjustment (Bräuninger, 2012; García-Díaz, 2018).

# 4.4.6.2.1. Theory, and Progressively Lowered Stress Threshold (PLST) and Environment fit (P-E fit) Theory

The Progressively Lowered Stress Threshold (PLST) model seeks to explore what leads to the manifestation of behavioural symptoms for individuals with dementia and was used as a guide to psychosocial interventions (Richards & Beck, 2004). The model postulates that an individual with dementia tends to have a low-stress threshold secondary to a person-environment whose interaction was disordered and has less ability to cope with stress (Richards & Beck, 2004). The P–E fit theory equally views the existing interactions between subjects and the environment (Phillips et al., 2010). The proponents of this theory believed that the environment might affect the subject while he/she influences the environment (Phillips et al., 2010).

According to the PLST model and P–E fit theory, music might reduce stress and anxiety due to providing a stimulus and response that can distract individuals' attention

from sources of stress and anxiety (Cheung et al., 2018; Jeffrey & Cary, 1990). The P–E fit theory emphasised both the person and his/her environment (Edwards & Shipp, 2007). The construct for persons focus on behaviour, hardiness, control locus, and coping styles (Edwards & Shipp, 2007; Sekiguchi, 2004). Coping might be done by either environmental changes or individual adaptation (Edwards & Shipp, 2007). Dance with movement intervention according to the PLST model might provide a framework for reducing behaviours that are challenging, and their frequency and severity is based on environmental stimuli (Lindsey & Buckwalter, 2009). Therefore, introducing a piece of music with movement might help in coping with stress and anxiety.

#### 4.4.6.2.2. Theory of Embodiment

Embodiment is a new approach to understanding the body (García-Díaz, 2018). Psychological processes are based on the state of the body (García-Díaz, 2018). As explained by the explicit theory, mind-body interaction is essential in psychotherapy, and the unity between our mind and body cannot be separated (Leitan & Murray, 2014). According to this theory, there is no hierarchical relationship between mind and body; (Leitan & Murray, 2014), and the mind does not direct the body; rather, their operation lies within the context in which action is developed (Leitan & Murray, 2014; Michalak et al., 2009). Body psychotherapy works through releasing and reshaping memories (somatic) for the effective management of psychological constraints (Totton, 2003). Formation of the bodily system is required to perceive, recognise, and interpret emotions in others or ourselves, and vice-versa (García-Díaz, 2018). States of emotion tend to affects the visceral, motor, and somatic systems (García-Díaz, 2018). Therefore, our bodily condition influences how we process emotional information. Literature has shown that movement

and body posture affects our states of affection and emotions (Niedenthal et al., 2009). Based on this, movement interventions may control individuals' emotions.

#### 4.4.6.2.3. Holistic Model of Psychological Stress Adjustment

Holistic stress management can be seen from two perspectives: 1) how we respond to the factors that trigger a person as a whole, and 2) how to address stress positively in a way that might impact an individual's happiness and health either on a long- or short-term basis (Gupta, 2008). Stressors might be annoying or unpleasant/unexpected events (Stetson, 1997). These events might act beyond our awareness; however, a subject may become used to them as time goes on, and they become part of their personality (Huljev & Pandak, 2016). To enhance subjects' psychological wellbeing, an intervention is needed, and dance has previously been used for stress management (Bräuninger, 2012; Steinberg-Oren et al., 2016). Dance movement intervention has been used in the past as a holistic model of psychological stress adjustment (Bräuninger, 2012). It can comprehensively adjust psychological health needs (Bräuninger, 2012). Evidently, the dance movement therapy model has been used for stress reduction (Ho et al., 2016) and lowers negative affects, both of which are emotion-focused coping (Bräuninger, 2012; Folkman & Lazarus, 1984). Table 4. Rationale and theories of dance interventions

	Author/year	Year	#2 Rationale	#2 Theories
1	Kaltsatou	2011	• Dance exercise is an attractive, beneficial activity (physical) that improves physical and psychological functioning (depression, anxiety, and stress), quality of life, fatigue, and cardiorespiratory fitness. It calms as well as reduces body weight by reducing body fat.	NA
2	Akandere	2011	<ul> <li>Dance enables humans to show the energy inside of them. Body language provides the subjects with an opportunity to speak their subconscious mind, which makes it an effective communication tool.</li> <li>Dance combines low impact exercise, music, and sensory stimulation as a form of non-pharmacological management for mild depression.</li> </ul>	NA
3	Cross	2012	<ul> <li>Music therapy is clinically beneficial to individuals in terms of images, memories, and emotional recall. The memories were positive, and music therapy, therefore, tends to have a therapeutic effect.</li> <li>Dance therapy incorporates music and movements to communicate differing themes symbolically using a non-verbal medium.</li> <li>Observing others performing the act of dance encourages one to participate.</li> </ul>	NA

4	Pinniger	2012	<ul> <li>Recreational activities (physical) reduce psychological distress, disability, and enhance physical well-being.</li> <li>Dance interventions require individuals to concentrate on learning new physical skills, which indirectly promotes psychological well-being.</li> </ul>	NA
5	Bräuninger	2012	<ul> <li>Dance has been used to reduce stress, improve wellbeing and allows individuals to tolerate higher levels of stress.</li> <li>Dance allows subjects to process and cognitively overcome frightening events. It also enables subjects to feel themselves physically and analyse problems more effectively.</li> <li>Dance is a constructive way of solving life problems and improves both self-esteem and body image.</li> <li>Dance stimulates the human vestibular system and creates a conscious state, thereby positively impacting the strength and fitness of the cardiac and vascular systems.</li> </ul>	The holistic model of the psychological stress adjustment
6	Baptista	2012	<ul> <li>Different types of physical activities were found to be effective in treating fibromyalgia and positively affect the quality of life.</li> <li>Aerobic exercise has more significant effects on pain, anxiety, depression, and physical functioning compared to stretching exercises.</li> </ul>	NA

7	Pinniger	2013a	• Partnered dance interventions were associated with positive effects on subjects' emotional state, compared to movement without a partner or exercise without music.	NA
8	Pinniger	2013b	<ul> <li>Having the opportunity to express emotions was associated with increased self-efficacy and reduced negative emotional states.</li> <li>Tango was previously found to be effective for psychological health and satisfaction in non-clinical samples.</li> </ul>	NA
9	Vankova	2014	<ul> <li>Physical activity interventions have significant effects on depressive symptoms by influencing individual biological processes.</li> <li>Dance interventions incorporate sociological, psychological and physiological components, which are enhanced by music. Collectively, these promote reminiscences.</li> </ul>	NA
10	Lee	2015	<ul> <li>Exercise promotes neurogenesis. It also promotes balance, independence, and an individual's physical state.</li> <li>Appropriate intensity exercise can promote the production of the neurochemical dopamine and improves motor disturbances in a subject.</li> </ul>	NA
11	Rios Romenets	2015	• Habitual physical activity is correlated with a lower risk of developing Parkinson's disease.	NA

- Traditional exercises were not appealing to individuals with Parkinson's disease.
- The association between music and the release of dopamine were correlated to establishing and maintaining relationships.
- Music affects the brain's ventral tegmental area, associated with the release of dopamine explaining it as a pleasurable stimulus.
- Combining exercise with music might increase motivation, enjoyability, and accessibility, leading to improved mood and cognition.
- 12
   Ho
   2016
   Dance interventions emphasise the relationship NA between mind and body in such a way that he/she can express the mind via dance movements.
  - Dance enables individuals to express themselves, reconnect and accept their bodies, cope with fear and depression symptoms, rebuild self-confidence and strengthen their resources.
  - Group dance enables subjects to support each other socially, and share concerns, emotions, and strategies for coping.
- Gao 2016 Individuals with a history of exercise were found to NA have a positive mood compared to sedentary individuals.
  - Aerobic exercises might help perimenopausal women reduce climacteric symptoms.

			• Square dance can mediate subjects' emotions by improving interpersonal relationships.	
14	Mavrovouniotis	2016	<ul> <li>Physical activities have psychological and physical benefits, and have been found to positively influence social relationships.</li> <li>Physical activities enhance the perception of self-efficacy and self-mastery.</li> <li>Physical activity results in better outcomes for health, mood states, functional capacity, and health-related quality of life.</li> </ul>	NA
15	Lopez- Rodriguez	2017	<ul> <li>Dance as a physical activity intervention incorporates the individual's cultural, cognitive, and emotional aspects involving sensory stimulation, social interaction, music and motor functions.</li> <li>Biodanza dance was found to reduce fibromyalgia impacts by reducing subjects' pain and stress. It equally enhances social skills and quality of sleep.</li> </ul>	NA
16	Lazarou	2017	<ul> <li>Aerobic activities are known to be effective in cognitive function improvement, and help prevents neurodegeneration.</li> <li>Dance can relieve pressure and tension due to its social enjoyability.</li> <li>Dance stimulates emotions, promotes social interactions, and exposes subjects to music and acoustic stimulation.</li> </ul>	NA

			• Spatial stimulation could be from environmental landmarks. Directional or translational inputs were responsible for stimulating hippocampal cells responsible for spatial recognition.	
17	Machacova	2017	<ul> <li>Dance is a socially enjoyable event that is familiar to older adults. Dance incorporates music, physical activity, and social interactions. It offers extra benefits, as it consists of musical components.</li> <li>Dance is effective for cognitive and physical impairments due to incorporating motor and physical skills and engaging subjects' cognitive functions, which might include memory, and perception.</li> </ul>	NA
18	Vinesett	2017	• Ngoma is an African traditional dance where people come together in response to musical rhythm under the guidance of a spiritual leader to create social support and address a problematic situation, healing (mind and body), and psychodynamic growth.	NA
19	Cheung	2018	<ul> <li>Music interventions help preserve cognitive function. They are associated with individuals' emotions.</li> <li>Preferential delivery of music is safer than pharmacotherapeutic agents, with fewer adverse effects.</li> <li>Music with movement intervention was the best approach for developing and reactivating archaic</li> </ul>	The Person-Environment Fit Theory, and Progressively Lowered Stress Threshold Model.

			expressive and relational abilities for promoting well-being and improving new learning strategies.	
20	García-Díaz	2018 •	Authentic movement is a creative process of developing the inner self in the mystical and transpersonal world for spiritual development. The mover in the authentic movement centres his/her attention and tries to identify physical impulse, feelings, mental images, emotions, or sensory experiences. It does so by expressing them through movement. The witness observes what happens to the mover; he/she holds space in supporting the dancers in terms of recognition, communication, and expressing their feelings.	Theory of embodiment
21	Lee	2018 •	Dancing socially was previously found to be effective for reconstructing severity, promoting a sense of empowerment, and redeveloping the social senses.	NA
22	Michel's	2018 •	The fluid movements in dance might help address postural instability, rigidity and bradykinesia associated with Parkinson's disease.	NA
23	Pinniger	2019 •	Dance has elements of social connection, interaction, and awareness of someone's body while moving in a synchronised fashion.	NA

24	Solla	2019	<ul> <li>Dance intervention is a form of workout that is NA appealing.</li> <li>It was effective due to undertaking it under the guidance of a dance teacher, the social nature of dance classes, and a supportive environment.</li> <li>Dance can stimulate the limbic system and cause emotional involvement that binds individuals' subjective experience with the objective, dynamic experience.</li> <li>Dance involves the motor effects of the rhythm, which might explain its therapeutic and symbolic function.</li> </ul>
25	Но	2020	<ul> <li>Dance intervention utilised the resources in the NA frontal lobe. Its movement was based on visual integration and path tracking. These components might activate the hippocampal and entorhinal networks related to subjects' spatial memory.</li> <li>Improved dance movements are associated with improved mood, memory, and cognitive function.</li> </ul>

NA=Not Available.

# 4.4.6.3. Item #3 Materials

Table 5 contains information on materials (item #3) needed for the dance intervention programme. The materials required to organise a dance intervention programme include 1) clinical instruments such as sphygmomanometer, wheelchairs, handheld dynamometer, measuring tape, and a wearable system for gait analysis (Akandere & Demir, 2011; Gao et al., 2016; Machacova et al., 2017; Solla et al., 2019); 2) musical instruments, including prerecorded special kinds of music, some of which might be on a compact disc; a hat, white lacuni attire, handbells, scarves, ribbons, elastic bands, triangle, and drums (Baptista et al., 2012; Cheung et al., 2018; Cross et al., 2012; García-Díaz, 2018; Ho et al., 2020; Lazarou et al., 2017; Machacova et al., 2017; Mavrovouniotis et al., 2016; Rios Romenets et al., 2015; Vankova et al., 2014; Vinesett et al., 2017); 3) programme instructional materials, including maintaining dietary habits (Akandere & Demir, 2011), programme advertisement (Pinniger, Brown, et al., 2013), study book, pamphlet or information package about dance (Baptista et al., 2012; Pinniger et al., 2012; Pinniger, Brown, et al., 2013; Pinniger et al., 2019; Rios Romenets et al., 2015), dance class instruction (Cheung et al., 2018; Lee et al., 2015), and 4) routine pharmaceutical treatment (Lee et al., 2018; Solla et al., 2019). Monitoring materials included an adverse event logbook (Michels et al., 2018), and an intervention checklist (Bräuninger, 2012). Other materials could include introductory letters (Pinniger, Thorsteinsson, et al., 2013), institutional websites (López-Rodríguez et al., 2017), and a computer (Ho et al., 2020).

# 4.4.6.4. Item #4 Procedure

As shown in Table 5, the dance intervention procedure (item #4) varies amongst the studies. Some started with a briefing session, where participants were advised to emphasise enjoyment rather than achieving a particular goal (Pinniger et al., 2012), while some

encouraged participants to leave the world behind and pay attention to the class events (Pinniger, Brown, et al., 2013; Pinniger et al., 2019), and the recordings of individual heart rate and blood pressure (Kaltsatou et al., 2011). In others, subjects were welcomed and encouraged to relax (Pinniger, Thorsteinsson, et al., 2013), and share experiences (López-Rodríguez et al., 2017), quiet times, and meditation (Vinesett et al., 2017).

#### 4.4.6.4.1. Warm-up

The activities for the warm-up sessions included stretching, muscle strengthening, motion exercises and cooling down process (Kaltsatou et al., 2011; Lee et al., 2018), free aerobic run, leg and neck movements, flexibility exercises, rotation of the hip and waist, and arm/shoulder rotation (Akandere & Demir, 2011), low-intensity stretching exercises (Pinniger et al., 2012), dance peculiar to an individual (Pinniger, Brown, et al., 2013), seated leg and arm movements (slow-paced), and balance check (Machacova et al., 2017; Michels et al., 2018; Vankova et al., 2014), a review of the previous class (Lazarou et al., 2017; Rios Romenets et al., 2015), balance/coordination training, ankle control exercises, mobilisation, and proprioception (Solla et al., 2019).

#### 4.4.6.4.2. Active Dance

The actual session varies depending on the dance type and dose. Some commence with the aerobic training phase, in which the subjects practice traditional dances. Each style lasted for 3-4 minutes with each having a low-impact step. The subjects hold hands in a semi-circle; and while changing the dance style, there was a 15-second break (Kaltsatou et al., 2011). A different study commences with basic steps with music, followed by couples, then promenade, hauling, hammerlock, and open surprise, each combined with music and couples dancing (Akandere & Demir, 2011). Dance might commence with a focus on different aspects of the dance, such as walking consciously, awareness of one's body and dance partner, weight

transference and resistance, and close embrace (López-Rodríguez et al., 2017; Pinniger et al., 2012; Pinniger, Thorsteinsson, et al., 2013), and each dance class began with a 10-minute walk, and at the halfway point, there is another 10-minute break (Pinniger, Brown, et al., 2013). The dance session may focus on self-awareness and creating interpersonal relationships between participants (Lee et al., 2015). The group dance was conducted one hour after supper with a five-minute break after every five minutes, and the intensity of the simple dance was moderate (Gao et al., 2016). Subjects may dance to the drumbeat, with a short rest break every 20 minutes for a discussion (Vinesett et al., 2017). Sequential performance was seen with 15 minutes for relaxing the meridians, 30 minutes of circulating qi, and 15-minutes of stabilising qi (Lee et al., 2018). Others employed the use of stretching and joint movements and exercising with towels (Ho et al., 2020), introducing new activities at each new session (Pinniger et al., 2019).

# 4.4.6.4.3. Wrap-up (cool down)

The wrap-up was the closing session for a dance intervention, also referred to as the cool down in some studies. It involved stretching and flexibility exercises (Akandere & Demir, 2011), experience sharing, questions for clarification, voluntary signing of a sign-out sheet (Pinniger et al., 2012), the introduction of choreographed dance steps for training at home (Baptista et al., 2012), and the introduction of relaxation techniques, such as stretching and deep breathing exercises (Machacova et al., 2017; Solla et al., 2019; Vankova et al., 2014), all accompanied by motivational music appropriate for each period (Machacova et al., 2017), singing a closing song (Cheung et al., 2018), or subjects given time to share their doubts and concerns (García-Díaz, 2018; Michels et al., 2018).

Finally, the most commonly reported warm-up was for 10 minutes (n=7, 28%) (Akandere & Demir, 2011; Kaltsatou et al., 2011; López-Rodríguez et al., 2017; Machacova et al., 2017; Pinniger et al., 2012; Pinniger et al., 2019; Vankova et al., 2014). Depending on

the programme's intensity, 40 minutes (n=3, 12%), and 60minutes (n=3, 12%) were the most frequently reported active dance durations (López-Rodríguez et al., 2017; Machacova et al., 2017; Pinniger et al., 2012; Pinniger, Brown, et al., 2013; Pinniger et al., 2019; Vankova et al., 2014). The wrap-up period was mostly reported to be 10 minutes in duration (n=9, 36%) (Akandere & Demir, 2011; Lazarou et al., 2017; López-Rodríguez et al., 2017; Machacova et al., 2017; Pinniger et al., 2012; Pinniger, Brown, et al., 2013; Pinniger et al., 2019; Solla et al., 2019; Vankova et al., 2014).

# Table 5. Materials and procedure of dance intervention

			#3 Materials	#4 Procedure
1	Kaltsatou	2011	Sphygmomanometer, handheld dynamometer, and a measuring tape.	Check-in with the recording of individual heart rate and blood pressure, 10-minute warm-up was stretching and motion exercises, 25-minute aerobic training phase where the participants learn to practice Greek dances (traditional), 3-4 minutes dance (per style) with each having steps (low impact), and holding hands in a semi-circle, a 15-second break between dances, 25-minutes upper body training and cool down
2	Akandere	2011	Instruction for maintaining normal dietary habits	10-minute warm-up where some exercise activities are provided, including free aerobic run, leg and neck exercises, flexibility exercise, rotation of the hip and waist, and arm/shoulder rotation; 90-minute dance (basic steps with music, followed by couples, then promenade, hauling, hammerlock, and open surprise each combined with music, and with couples), 10 minutes of cooling (stretching and flexibility exercises).
3	Cross	2012	Pre-recorded music on Compact Disc	30-minute live dance only in different styles.
4	Pinniger	2012	Written information about the study, advice on voucher offers.	10-minute briefing session where subjects are advised to emphasise enjoyment rather than achieving a particular goal; 10-minute warm-up where low-intensity stretching exercises were provided; 60-minute dance with a focus on different aspects of the dance, such as walking consciously, awareness of one's body and dance

				partner, weight transference and resistance, and close embrace; and a 10-minute wrap-up where subjects are required to share their experience,
				ask questions for clarification and sign the
5	Brauninger	2012	Intervention checklist.	Participants chose methods, approaches, or defined interventions.
6	Baptista	2012	Compact disc with music and a book with the history of the proposed dance movements.	Classes begin with warm-up, predetermined movement, choreography and cool-down exercises. A choreographed dance step was introduced for home training in week 4.
7	Pinniger	2013a	Introductory letter (mail).	At the beginning of the session, participants were welcomed and encouraged to relax, and warmup was the brief review. Walking consciously, weight resistance and transference, as well as body awareness, were discussed and practised. A new challenge introduced, ends with a wrap-up.
8	Pinniger	2013b	Programme short advert, a hat, introductory information about the study.	Participants are encouraged to leave the world behind and pay attention to the class; followed by a warmup period where dance peculiar to the individual was practised; a 60-minute dance class (each began with 10minutes of walking), a 10-minute break at the halfway point, and a 10- minute wrap-up.
9	Vankova	2014	Music of choice	10-minutes of warm-up, consisting of seated legs and arms movements (slow-paced), 40 minutes leading the dance and a 10-minute cool-down period, which consisted of relaxation techniques such as stretching and deep breathing exercises.
10	Lee	2015	Dance class instructions,	30 minutes of neurodevelopmental treatment, 15 minutes of functional electrical stimulation, 30 minutes of dance exercise. Each dance session

				focuses on self-awareness and creating interpersonal relationships amongst the participants.
11	Rios Romenets	2015	Traditional Argentine Tango music, and a pamphlet about dance exercise.	Began with the previous class review, plus new steps, followed by improvisation activities and standard footwork exercises.
12	Но	2016	Computer	Six 90-minute sessions, twice weekly for three weeks
13	Gao	2016	Sphygmomanometer	Group dance one hour after supper for 60-90 minutes with a five-minute break after every five minutes, and the intensity of the simple dance exercise was moderate.
14	Mavrovouniotis	2016	Disco music for the aerobic dance Multiple kinds of Greek music	Scheduled one hour (morning/afternoon). No time was scheduled.
15	Lopez-Rodriguez	2017	Institutional website	Shared experiences start with 10 minutes of low- intensity movement with music as a warm-up, 40 minutes of active dance (involving dance movements, exercising, and walking), and a 10- minute wrap-up.
16	Lazarou	2017	Special kinds of music	Five-minute warm-up where previous dance sessions were revised, 45 minutes of new material (figure/dance steps), and a 10-minute cool-down session.
17	Machacova	2017	Motivating music, wheelchairs for some subjects	10-minute warm-up period consisting of slow- paced arm and leg movements, a 40-minute main dance period where basic ballroom dance steps, and a 10-minute cool-down period where relaxation techniques are employed, e.g., stretching and breathing exercises, and all accompanied by motivating music appropriate for each period.

18	Vinesett	2017	White lacumi attire, drums	10-minutes period of meditation, 10 min of quiet time. The purification process and the participants' meditative activity were followed by 1-hour and 15-min, during which participants danced to drums with a short rest break every 20 min for discussion.
19	Cheung	2018	Musical instruments such as drums, hand bells, and triangles. Preferred music was also provided and an activity manual.	Five minutes for singing a greeting song, 20 minutes for MM activities, and five minutes for singing a closing song.
20	García-Díaz	2018	Bell	The experimental condition is seven minutes (for both authentic and voluntary movements. Subjects were given 30 minutes to share their doubts and concerns.
21	Lee	2018b	Routine pharmaceutical treatment	Stretching relaxation exercises, strengthening muscles, and cooling down process. The program was in a sequence with 15 minutes for relaxing the meridians, 30 minutes of circulating qi, and 15 minutes of stabilising the qi.
22	Michels	2018	Adverse event logbook	Seated warm-up, group rhythmical movement (exploring different rhythms), balance check, dance movement, group discussion (experience sharing).
23	Pinniger	2019	Study information package, reply paid envelope for questionnaires.	Begins with a relaxation session where subjects pay attention to class and leave the world behind; 10 minute-warm-up, 60-minute dance class, new activities introduced at each new session, 10- minute wrap-up.
24	Solla	2019	Medical therapy, a wearable system for gait analysis.	30-minutes warm-up, balance coordination/training, ankle control exercises, breathing exercises, mobilisation, and proprioception; 50 minutes of Sardinian dance

25 Ho 2020 Small musical instruments, ribbons, scarves, and elastic bands.
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# 4.4.6.5. Item #5 Interventionists

A dance teacher is a person who provides training and instructions to students by incorporating choreography and the performance of different techniques in their educational instruction (Van Rossum, 2004). In contrast, a dance therapist is a certified professional in the art of movement for therapeutic purposes to address a range of emotional, behavioural, and physical problems (Schmais & White, 1986).

As shown in Table 6, most studies (n=14, 56%) were administered by dance teachers. Dance teachers are individuals who provide dance instructions to the participants (Lazarou et al., 2017; Lee et al., 2018; López-Rodríguez et al., 2017; Machacova et al., 2017; Michels et al., 2018; Pinniger et al., 2012; Pinniger, Brown, et al., 2013; Pinniger, Thorsteinsson, et al., 2013; Pinniger et al., 2019; Solla et al., 2019; Vankova et al., 2014; Vinesett et al., 2017). Professional dance therapists are registered specialists who work on understanding the connections between the human body and mind, and use that connection to assess and treat clients; and in this study, they administer dance (n=4, 16%) (Bräuninger, 2012; García-Díaz, 2018; Ho et al., 2020; Ho et al., 2016). Certified healthcare professionals, such as physiotherapists, physicians, and nurses (n=4, 16%) received training and delivered the interventions (Baptista et al., 2012; Cheung et al., 2018; Gao et al., 2016; Kaltsatou et al., 2011). Others were physical and health educators (n=2, 8%) (Kaltsatou et al., 2011; Mavrovouniotis et al., 2016), and a virtual machine (n=1, 4%) (Lee et al., 2015). Although different names have been used, the professionals' credentials are not clear in the articles.

# 4.4.6.6. Item #6 Mode of intervention delivery

As shown in Table 6, the dance intervention delivery mode was entirely face-to-

face.

No	Author/year	Year	#5 Interventionist	#6 Mode of delivery
1	Kaltsatou	2011	PE teacher and physiotherapist.	Supervised face to face
2	Akandere & Demir	2011	NA	Supervised face to face
3	Cross	2012	NA	Supervised face to face
4	Pinniger	2012	Dance teacher	Supervised face to face
5	Bräuninger	2012	Dance therapist	Supervised face to face
6	Baptista	2012	Physiotherapist	Supervised face to face
7	Pinniger	2013a	Dance teacher	Supervised face to face
8	Pinniger	2013b	Dance teacher	Supervised face to face
9	Vankova	2014	Dance teacher	Supervised face to face
10	Lee	2015	Virtual machine	Supervised face to face
11	<b>Rios Romenets</b>	2015	Dance teachers	Supervised face to face
12	Но	2016	Dance therapist	Supervised face to face
13	Gao	2016	Professional coach and physician	Supervised face to face
14	Mavrovouniotis	2016	Physical education teacher	Supervised face to face
15	Lopez-Rodriguez	2017	Dance teacher	Supervised face to face
16	Lazarou	2017	Dance teacher	Supervised face to face
17	Machacova	2017	Dance teacher	Supervised face to face
18	Vinesett	2017	Dance teacher	Supervised face to face
19	Cheung	2018	Nurse	Supervised face to face
20	García-Díaz	2018	Gestalt therapist	Supervised face to face
21	Lee	2018	Dance teacher	Supervised face to face
22	Michels	2018	Dance teacher	Supervised face to face
23	Pinniger	2019	Dance teacher	Supervised face to face
24	Solla	2019	Dance teacher	Supervised face to face
25	Но	2020	Dance therapist	Supervised face to face

Table 6. Rationale, theories, interventionists, and dance intervention delivery mode

NA=Not Available.

# 4.4.6.7. Item #7 Intervention delivery location type

As shown in Table 7, the majority of dance studies was delivered in communities (n=8, 32%), followed by nursing home or residential care facilities (n=3, 12%) or clinics (n=3, 12%). However, some studies (n=5, 20%) did not specify their study locations.

# 4.4.6.8. Item #8 Intervention frequency

As shown in Table 7, the most commonly reported intervention frequencies were once weekly (n=9, 36%), twice-weekly (n=9, 36%), thrice-weekly (n=3, 12%), four times weekly (n=1, 4%) and five times per week (n=2, 8%).

# 4.4.6.9. Item #8 Course of interventions

As shown in Table 7, the course of the dance interventions identified from the studies that were included ranges from 12 weeks (n=8, 32%), 6 weeks (n=3, 12%), 8 weeks (n=3, 12%), and undefined (n= 2, 8%), while 1, 2, 3, 10, 16, 24, and 40 had (n=1, 4%) each.

# 4.4.6.10. Item #8 Duration of exposure

As shown in Table 7, the duration of exposure per session differs amongst the studies, and includes 110 minutes (n=1, 4%), 90 minutes (n=8, 32%), 75 minutes (n=2, 8%), 60 minutes (n=10, 40.9%), and 30 minutes (n=3, 12%).

## 4.4.6.11. Item #9 Tailoring

As shown in Table 7, the interventions were tailored in two studies only. Subjects received functional electrical stimulation and neurodevelopmental treatments for 15 and 30 minutes, respectively. These were given five times a week for six weeks, apart from the

dance. Another study monitored the study subjects' heart rates throughout the intervention, with the maximum value of the  $VO_2$  put at 40%-60%.

					Dose item #8			
S/no	Author/year	Year	#7 Type of location	Frequency (no./week)	Course (week)	Session duration (min)	Total minutes per week	#9 Tailoring
1	Kaltsatou	2011	Not specified	3	24	60	180 minutes	Not reported
2	Akandere & Demir	2011	Not specified	3	12	110	330 minutes	Not reported
3	Cross	2012	Board and care facility	1	1	30	30 minutes	Not reported
4	Pinniger	2012	Community	1	6	90	90 minutes	Not reported
5	Bräuninger	2012	Communities	1	12	90	90 minutes	Not reported
б	Baptista	2012	Community	2	16	60	120 minutes	Not reported
7	Pinniger	2013a	Classroom	4	2	90	360 minutes	Not reported
8	Pinniger	2013b	Community	2	4	90	180 minutes	Not reported
9	Vankova	2014	Residential care facility	1	12	60	60 minutes	Not reported
10	Lee	2015	Clinic	5	6	30	150 minutes	Participants received functional electrical stimulation, and neurodevelopmental treatments for 15, and 30 minutes respectively five times a week for six weeks, apart from the dance.
11	Rios Romenets	2015	Clinic	2	12	60	120 minutes	Not reported
12	Но	2016	Hospital community and university	2	3	90	180 minutes	Not reported

Table 7. Location of delivery, dose, and tailoring of dance interventions

13	Gao	2016	communities	5	12	75	375 minutes	Not reported
14	Mavrovouniotis	2016	Not specified	3	Undefined	60	180 minutes	Not reported
15	Lopez-Rodriguez	2017	University facility	1	4	90	90 minutes	Not reported
16	Lazarou	2017	Community	2	40	60	120 minutes	Not reported
17	Machacova	2017	Nursing home	1	12	60	60 minutes	Not reported
18	Vinesett	2017	Not specified	1	8	75	75 minutes	Not reported
19	Cheung	2018	Nursing homes	2	6	30	60 minutes	Not reported
20	García-Díaz	2018	Community	Undefined	Undefined	7	NA	Not reported
21	Lee	2018	Hospital	2	8	60	120 minutes	Not reported
22	Michels	2018	Movement studio	1	10	60	60 minutes	Not reported
23	Pinniger	2019	Not specified	1	8	90	90 minutes	Not specified
24	Solla	2019	Outpatient health clinic	2	12	90	180 minutes	Not specified
25	Но	2020	Not specified	2	12	60	120 minutes	Heart rate monitoring throughout the entire intervention period, with $40\%-60\%$ of the VO <sub>2</sub> as the maximum value.

DMT=Dance Movement Therapy, MWM=Music with Movement; PE: Physical Education.

## 4.4.7. The outcomes

There is an increasing need for screening tools to identify common mental health problems in Africa. We, therefore, extracted the outcomes/outcome measures used for measuring the outcomes in our systematic review. Four outcomes of depressive symptoms, anxiety, stress, and sleep were evaluated from the 25 articles.

# 4.4.7.1. Depressive Symptoms

Depressive symptoms was measured by the Beck's Depression Inventory (BDI) (n=10, 40%) (Akandere & Demir, 2011; Baptista et al., 2012; Cross et al., 2012; Kaltsatou et al., 2011; Lazarou et al., 2017; Lee et al., 2015; Lee et al., 2018; Michels et al., 2018; Rios Romenets et al., 2015; Solla et al., 2019). Geriatric Depression Scale (GDS) (n=5, 20%) (Cheung et al., 2018; Ho et al., 2020; Machacova et al., 2017; Pinniger, Brown, et al., 2013; Vankova et al., 2014). Depression Anxiety Stress Scale-21-Depression (DASS-21-D) subscale (n=4, 16%) (Pinniger et al., 2012; Pinniger, Brown, et al., 2013; Vinesett et al., 2017), and Centre of Epidemiology Study Depression (CESD) scale (n=2, 8%) (López-Rodríguez et al., 2017; Vinesett et al., 2017), Escala de Valoración del Estado de Ánimo (EVEA) (n=1, 4%), (García-Díaz, 2018), Zung Self-Rating Scale (ZSRS) (n=1, 4%) (Gao et al., 2016), and Profile of Mood State (PMS) (n=1, 4%) (Mavrovouniotis et al., 2016).

#### 4.4.7.2. Anxiety

Depression Anxiety Stress Scale-21-Anxiety (DASS-21-A) subscale was the most commonly reported tool for assessing anxiety (n=4, 16%) (Pinniger et al., 2012; Pinniger, Brown, et al., 2013; Pinniger et al., 2019; Vinesett et al., 2017), while others were the Brief Symptoms Inventory (BSI) (n=1, 4%), State-Trait Anxiety Inventory (STAI) (n=1, 4%), Hospital Anxiety Depression Scale (HADS) (n=1, 4%), and EVEA (n=1, 4%) (García-Díaz, 2018).

#### 4.4.7.3. Stress

Stress was measured using the Depression Anxiety Stress Scale-21-Stress (DASS-21-S) subscale (n=4, 16%) (Pinniger et al., 2012; Pinniger, Brown, et al., 2013; Pinniger et al., 2019; Vinesett et al., 2017), and Perceived Stress Scale (PSS) (n=2, 8%) (Ho et al., 2016; López-Rodríguez et al., 2017).

# 4.4.7.4. Insomnia

Insomnia Severity Index (ISI) (n=2, 8%) and Pittsburgh Sleep Quality Index (PSQI) (n=2, 8%), were used to assess insomnia (Ho et al., 2016; López-Rodríguez et al., 2017; Pinniger, Brown, et al., 2013; Pinniger, Thorsteinsson, et al., 2013).

# 4.4.7.5. Selection of outcome measures for use in the ACD programme

From the systematic review evidence, Beck's Depression Inventory (n=10, 40%) was the most commonly used measure for depression; however, it assessed only one construct. We, therefore select Depression Anxiety Stress Scale-21 (4, 16%) because it measures three constructs (depression, anxiety, and stress) to reduce assessment time for the subjects. Insomnia Severity Index was selected because insomnia is associated with our primary outcome (depressive symptoms). We employed various coping strategies in the ACD, and want to know whether coping is improved or not, a panel of experts also recommends its addition. Hence, the use of the Brief COPE scale. Details of each tool can be found in Chapter Five.

#### 4.4.8. Overall summary of the systematic review results

# 4.4.8.1. Effects of dancing interventions

The results of the individual studies show that dance intervention was effective to reduce stress, anxiety, depressive symptoms, and sleep, with a small-large effect size. For the between-group effects, dance significantly reduced depressive symptoms, with a pooled estimate of SMD of -.44 (95% CI -.61, -.26, P<.001). The effect on anxiety and stress was also significant with an SMD .27 (95% CI -.53, -.01, P<.05), and -.42 (95% CI -.63, -.21, p<.01). On the contrary, the effect on sleep was insignificant, with a trivial effect size SMD -.13 (95% CI -.35, .10, p>.05).

#### 4.4.8.2. Dance intervention components

As shown in Table 8, to organise a dance intervention programme, a rationale is required to explain why it is beneficial. Dance is beneficial due to its cultural relevance, attractiveness and combination of low impact physical activity exercises, music and sensory stimulation, and social interactions, and it also serves as a medium of communication. These combined factors influence individual physical, psychological, social, cognitive, and emotional functions. Theories, such as the theory of embodiment, holistic model of psychological stress adjustment, the person-environment fit theory, and progressively lowered stress threshold model, were used. To organise a dance programme, materials were needed, including 1) clinical materials e.g., sphygmomanometer, 2) musical instruments e.g., pre-recorded special kinds of music, 3) programme instructional materials e.g., information package about the dance, and 4) monitoring materials e.g., adverse events log book, intervention checklist. The dance procedure should start with a 10-minute warm-

up, followed by a 30-60-minute dance and a 10-minute cool-down. A certified expert (therapist or specialised), healthcare professionals, and physical and health educators are required to administer the dance. Dance interventions might be conducted in communities, clinics, and nursing or residential care homes. The dose of dance intervention should have a course in a range of 6-12 weeks, with frequencies of once, twice, thrice-weekly, or four or five times per week, and the reported duration of exposure was 30, 40, 60, 75, 90, and 110 minutes, respectively. Dance interventions might be tailored depending on the client's condition, e.g., subjects with Parkinson's disease may receive functional electrical stimulation and neurodevelopmental treatments for 15 and 30 minutes, respectively. These were given five times a week for six weeks, apart from the dance. The subjects' heart rates might be monitored throughout the intervention, with the maximum value of the VO<sub>2</sub> at approximately 40%-60%.

	Table 8. Summa	ry of the	dance i	intervention	components
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No	Item	Details
#2	Why (rationale)	Dance is beneficial due to its cultural relevance and attractiveness.
		Dance combines low physical activity exercises, music and sensory
		stimulation, social interactions, and also serves as a medium of
		communication. These together influence individual physical,
		psychological, social, cognitive, and emotional functions.
#2	Why (theories)	Three theories were found to be useful in dance intervention
		programmes: theory of embodiment, holistic model of psychological
		stress adjustment, the person-environment fit theory, and
		progressively lowered stress threshold model.
#3	Materials	These include 1) clinical materials e.g., sphygmomanometer, 2)
		musical instruments e.g., pre-recorded special kind of music, 3)
		programme instructional materials e.g., information package about the
		intervention checklist
#1	Drocadura	Briefing cossion 10 minute warm up 30.60 minute dance and 10
#4	Flocedule	minute cool-down.
#5	Who provided	A certified expert (therapist or specialised), healthcare professionals,
		and physical and health educators.
#6	How	Supervised face-to-face contacts.
#7	Where	Communities, clinics, nursing or residential care homes.
#8	When and how much	Course: 6-12 weeks; Frequency: once, twice, thrice, four or five times
		per week; duration of exposure: 30, 40, 60, 75, 90, and 110 minutes.

#9	Tailoring	Subjects received functional electrical stimulation and
		neurodevelopmental treatments for 15 and 30 minutes, respectively.
		These were given five times a week for six weeks apart from the dance.
		Another study monitors the heart rates of the study subjects throughout
		the intervention, with the maximum value of the $VO_2$ at 40%-60%.

#### 4.4.8.3. Potentially effective components of dance intervention

For dance intervention to be effective, the procedure should start with a brief session for at least 5-minutes, followed by a 10-minutes warm-up, with an active dance session for a minimum of 30-60 minutes, and closing the dance session with a 10-minutes wrap-up. Musical materials such as the pre-recorded kind of music or drums, and using a traditional attire may likely play a role in dance effects. Effective dancing intervention may be the one delivered by a therapist or specialists. To become a dance therapist, specific graduate training and certification is required from academic institutions, and registration with relevant agencies such as the American Dance Therapy Association (ADTA) (Miller et al., 2016). For dance specialist requirements, he/she must have experience in facilitating dance classes to individuals to enhance their ability and knowledge of a particular type of dance and be a community member of a society where that dance is practice.

#### 4.4.8.4. Limitations of the Review

Considering the high heterogeneity observed among the studies included, and wide samples variation, caution should be applied in interpreting the results. Again, the different follow-up time points across the included studies at both T1 and T2 makes it difficult for the generalisation of findings as some were shorter while others are longer.

# 4.4.8.5. Proposed Components of the ACD Dance

Deducing from the review evidence, the ACD dance will last for eight weeks. The review has shown that the most commonly reported course of dance intervention was between 6 to 12 weeks; however, we chose eight weeks due to unknown feasibility issues. The proposed duration was 75-minutes which was obtained from the average of the two most commonly reported durations (i.e., 90 and 60 minutes, respectively). The intervention will be delivered by an experienced dance specialist, and the session will commence with a 5-minutes check-in session, 10-minutes warm-up, and 10-minutes cool-down sessions at the end of the intervention.

#### 4.5. Objective 3. ACD programme development for adults with depressive symptoms.

#### 4.6. Methods

A Delphi method is a structured process of forecasting, where a panel of experts validate a designed study framework after many rounds of questionnaires are sent to them (Hsu & Sandford, 2007). This technique has been used in developing many research protocols; therefore, we employed it to develop the ACD intervention Protocol. ACD protocol was developed using the steps shown in Figure 12.

# 4.6.1. Raw materials preparation

The ACD intervention content was developed from systematic review and metaanalysis, while brief health education content was adopted from the 10-stress busters developed by the National Health System as a stress management guideline (Salihu et al., 2021). The brief health educational content has been tested to be effective (Salihu et al., 2021). Brief health education was found to be effective in reducing anxiety in individuals with a history of traumatic experiences, and it might augment the effects of dance interventions on depressive symptoms and stress (Salihu et al., 2021). The brief health education contents were the simple stress busters developed by the NHS (National Health System, 2017). Simple stress buster is a form of brief health education and has been tested as a short term fix for stress (Jenkinson, 2018). The main aim of using this educational content was to equip the IDPs population with the necessary knowledge for managing stress, and it was known to be complementary with the dance intervention (Salihu et al., 2021).

# 4.6.2. Identification of experts

Since Delphi relies on experts, we recruited panel members if 1) they were academic professors with previous experience in designing an intervention study with educational or music components, 2) a registered mental health nurse with a minimum of 10 years' experience, 3) a psychologist with at least 10 years' clinical experience, 4) the nurse and psychologist must have a minimum of a master's degree, and 5) an ACD specialist must have a minimum of 20 years of experience in leading an African dance. To assess the preliminary acceptability of the ACD programme, two IDPs living in camps (one man and one woman) in Africa were asked to provide their input. After assembling the panel of experts, we began the Delphi consultation process.

### 4.6.3. The Delphi process

The constituted expert panel conducted a round of anonymous reviews by responding to rounds of questionnaires until a satisfactory consensus was achieved. All, except for two non-specialists (laypeople), were invited to comment on the ACD

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Programme – on whether it was feasible, relevant, and appropriate. Two local people from the camp provided comments on whether ACD was acceptable. The experts used a checklist with key components for ratings and comments. The panel was required to rate the programme items based on a 4-point scale (1 = not relevant, 2 = mostly relevant, 3 =relevant and 4 = very relevant) (Appendices 6 and 7). Content validity is considered a process by which a designed programme is evaluated for its construct appropriateness (Polit & Beck, 2006a). The Content Validity Index (CVI) was considered an indicator to which the designed programme's content was rated, on average, by the expert panel (Polit & Beck, 2006a). The ACD programme CVI was rated 1-4 in terms of appropriateness and relevance. In the evaluation, a CVI score of .8 or more is good content validity (Polit & Beck, 2006a). Fleiss' marginal multi-rater kappa coefficient was used to calculate the inter-rater agreement for the designed study content. The review reports from the panel were analysed and revised. If the consensus agreement reached  $\geq 80\%$ , the Delphi process was completed; if not, we changed it according to the comments and redid the Delphi (Figure 12) (Van Steenkiste et al., 2002; Yang et al., 2013).



Figure 12. Delphi technique flow chart
## 4.7. Results

## 4.7.1. Experts identified

The identified experts comprised two academic professors with experience designing an interventional study with music or brief health educational components. Others included a mental health nurse, a psychologist, a PhD, and a master's degree holder. An ACD expert with a minimum of 20 years of experience in leading an African dance was also recruited (Table 9). These together formed the expert panel. In addition, two people living in an IDP camp in Africa (one man and one woman) were interviewed to assess their acceptance of the programme.

 Table 9. Experts Panellists

Code No	Field of specialisation			Academic qualification	Years of experience	
001	Nursing			Doctor of Philosophy	≥20	
002	Nursing			Doctor of Philosophy	≥10	
003	Psychologist			Master of Science	≥10	
004	Mental health nurse			Doctor of Philosophy	≥10	
005	African	Circle	Dance	Bachelor of Science	≥20	
	specialist					

#### 4.7.2. Preparatory materials

Twenty-five trials were identified in the review process, and their profile, outcomes, and intervention component information were extracted, tabulated, and used as background information for the ACD protocol development. Eventually, the systematic review findings informed the relevant dosage, duration of the ACD dance protocol, and potential ACD learners. Based on the systematic review results, knowing the active intervention components, the proposed ACD programme had two parts (i.e. African Circle Dance and brief health educational components) administered to the intervention and control groups. In determining the ACD parts, we considered the most frequently occurring/reported parts in terms of the dosage, place of intervention delivery, mode of intervention delivery, who delivered the intervention, and the necessary information/educational packages extracted from Tables 4 and 5.

The ACD programme was developed based on preliminary systematic review evidence, and a theoretical framework and content subjected to expert panel review opinion. The ACD programme had never been tested before. Our systematic review evidence has shown that for a dancing intervention to be effective, (1) a therapist or specialist is needed, (2) the delivery method should be face-to-face, (3) with a minimum duration of at least 30 minutes, (4) at a frequency range of one to four sessions per week, (5) the programme course was between six to 12 weeks. Our ACD intervention protocol has met these criteria.

### 4.7.2.1. African circle dance content

In the developed ACD component, the intervention group participants will receive ACD dance for 75 minutes once per week for eight weeks. Group dance will be adopted with 8-12 subjects per group. The intervention will start with a five-minute briefing, 10-minute warm-up, 50 minutes of active dance, and 10 minutes of cool down.

## 4.7.2.2. The ACD programme Brief health educational component

Because all subjects eligible in this study exhibited depressive symptoms and needed minimal intervention per the 1964 Helsinki declaration, we, therefore, introduced the standard care (brief health education) component to both study arms of the ACD programme. Educational intervention for promoting health has been used alongside dance intervention in the past and was found to reduce depressive symptoms, and stress (Roussel et al., 2014; Salihu et al., 2021). Brief health education was a gold standard cost-effective (i.e., inexpensive) approach for stress management recommended by the NHS which can be used in a resource-deprived area (Salihu et al., 2021). The simple stress buster is a form of brief health education and has been tested as a short term fix for stress (Jenkinson, 2018). A review of evidence has shown that brief health education is standard care given to displaced persons as one of the mental health and psychosocial support (MHPSS) interventions in conflict-affected settings (Kamali, et al., 2020). Further, the United Nations High Commissioner for Refugees (2007) recommended brief educational interventions to be incorporated as part of the basic services for promoting the mental health of the IDPs in emergency settings. Therefore, brief health education on stress management was developed, based on the National Health System (NHS) and 'stress-coping theory' to increase knowledge related to IDPs' environment, resources available, stress management, and healthcare behaviour.

Brief health education was designed based on the National Health System (NHS) and the Folkman and Lazarus stress-coping theory (problem-solving and emotional coping) to teach the IDPs basic stress management techniques with an emphasis on self-care, a supportive environment, and the buddy system because all of these things are found to be helpful to this cohort (Theodoratou et al., 2015). It was a strategy to facilitate the clients' development of adaptive coping strategies in IDP camps, using the cognitive behavioural approach adopted in many health education programmes. The self-care, to be administered by the mental health nurse, will focus on nutrition, relaxation, and a healthy lifestyle (Mino et al., 2006; Theodoratou et al., 2015). This is to equip them with the necessary skills for lifestyle modification which might help modify those traditional belief factors detrimental to their health and wellbeing. The stress management content will consist of 60 minutes of brief health education on stress, emphasising positive recognition of stressors and coping, social support and a buddy system, sleep and a supportive environment, nutrition, and exercise/relaxation. These were grouped into two, i.e., a) provision of support on coping and adjusting with stress using available resources (helping other people, connecting with people, being positive, accepting those things you cannot change, as well as having 'me time', and b) positive healthcare behaviours for them to practice (being active, challenging self, avoidance of unhealthy habits, taking control, and working smarter, not harder). Brief health education is to be delivered twice by a trained mental health nurse within the respective camps. A leaflet with weekly exercise records was provided to the participants to take home, with simplified steps for handling stress. A 20-30-minute sharing session was held after the brief health education session. The second session was held in week 4 for reinforcement and problem solving of issues raised by participants and lasted 30-40 minutes.

# 4.7.2.2.1. Simple stress busters

If an individual is stressed, the first strategy to handle or manage the stressor is to identify the cause. Individuals should avoid unhealthy activities that cannot help them cope (Kisner et al., 2017; National Health System, 2017). As shown in Figure 13, the key to effectively manage stress is to build strength emotionally, take control of the situation and have good social connections, adopting a positive outlook (Kisner et al., 2017; National Health System, 2017). The National Health System recommends 10 approaches to handle stress effectively.



Figure 13. Simple stress busters

## 4.7.2.2.1.1. Being active

The exercise was identified as one of the processes of overcoming stress due to its ability to reduce an individual's emotional intensity (National Health System, 2017; Viveros & Schramm, 2018). Exercise has been found to affect mental wellbeing, as it can protect a person from anxiety, lowers depression, changes mood, and promotes self-esteem, due to its ability to stimulate the release of neurochemicals (National Health System, 2017; Sharma et al., 2006; Viveros & Schramm, 2018). The recommended amount of physical activity for every adult aged  $\geq$  19years was 150 minutes of moderate-intensity exercise (aerobic), such as cycling or walking, per week (National Health System, 2017).

#### 4.7.2.2.1.2. Take control

Evidence has shown that people's feelings of loss of control might be one of the leading causes of stress affecting their wellbeing (National Health System, 2017). Likewise, taking control is empowering and an effective way of finding solutions to problems (National Health System, 2017). Time management is one way for people to take control of their issues, as it helps them be more focused, relaxed, and achieve life balance (National Health System, 2017). Tips for effective time management include: working out goals, making a to-do list, focusing on results, having a lunch break, and prioritising essential tasks (National Health System, 2017; Sharma et al., 2006).

## 4.7.2.2.1.3. Connecting with people

A proper social network is vital for mental wellbeing (National Health System, 2017). A social network could include friends, family, or work colleagues, who can help a person see things differently (National Health System, 2017). Connecting with people helps an individual enjoy the support of others (National Health System, 2017). Doing activities with friends, allowing the subject to relax, and laughing together is an excellent stress reliever. Discussing problems with others can help one obtain suggestions that can solve his/her problems (National Health System, 2017; WebMD, 2019). Literature evidence has shown that people with exceptional social support have higher chances of living longer, due to an increased sense of security, belonging, and self-worth (Viveros & Schramm, 2018).

#### 4.7.2.2.1.4. Challenging yourself

To become emotionally resilient, one needs to continue learning. Learning will arm an individual with knowledge, and makes individuals active rather than passive (National Health System, 2017). Learning could be done by watching television, learning new sports or games, studying a new language, and might help build confidence in dealing with stress (National Health System, 2017).

## 4.7.2.2.1.5. Avoid unhealthy habits

Some people resort to drinking alcohol, caffeine, and smoking to cope with stress, which could be detrimental to their well-being (National Health System, 2017). Long term substance intake won't solve an individual's problems but can create new ones while providing only temporary relief (National Health System, 2017). Hence, tackling the root causes of stress is paramount.

## 4.7.2.2.1.6. Help other people

One factor contributing to individual resilience is being involved in volunteer activities or community work (National Health System, 2017). Again, helping others who are worse off might help, and by doing so, the more resilient and happy a person feels (National Health System, 2017). For those who do not have time to volunteer, try doing someone a favour, for example, providing help crossing a road, or going for a coffee (National Health System, 2017).

4.7.2.2.1.7. Having some "Me time"

This is the time an individual spends relaxing alone. IDPs were advised to take some time off work (if any) to socialise, relax, and exercise. They were instructed to create something just for fun, visit friends, take a nap, indulge in a hobby, have a grown-up play date, upgrade their daily shower, and take time to meditate (National Health System, 2017).

### 4.7.2.2.1.8. Work smarter, not harder

The term 'working smarter' means prioritising individuals' work by only concentrating on the tasks that make a real difference, while putting less important tasks lower on the to-do list (National Health System, 2017).

## *4.7.2.2.1.9. Try to be positive*

To effectively handle stress, there is a need to be positive with life situations (National Health System, 2017). In essence, one should appreciate what he/she has, and the easiest way of doing that is to identify three things that went well every day (National Health System, 2017). Positive thinking allows the individual to approach an unpleasant situation positively, and also helps a person resist mental distress (Viveros & Schramm, 2018).

#### 4.7.2.2.1.10. Accept the things you cannot change

Under normal circumstances, it is difficult to change challenging situations, so individuals should concentrate on the things they have control over (National Health System, 2017).

## 4.7.3. The Delphi Process

#### 4.7.3.1. First-round Delphi

After identifying the ACD and brief health educational contents, we chose a group of experts (n=5). An invitation letter was sent to them. After gaining their acceptance, a checklist alongside the developed ACD programme intervention protocol was sent, inviting them to rate and freely comment on areas needing improvement, changes, or further clarification. The identities of the panel judges were blinded to all members. After the first round of Delphi, the panel's comments/suggestions or recommendations were analysed, summarised, and revised with justifications.

## 4.7.3.2. Major concerns in the first round Delphi

In the first round of comments, the experts felt that the ACD duration seemed to be relevant, but required supporting evidence (Table 6). They equally recommended that the course/duration be assessed for acceptability by adults and the participants who were depressed, as to whether they could cope with 75 minutes of activity without fatigue. We deduced from Table #6 that most of the previous dance studies (n=17, 68%) for individuals with depressive symptoms were longer than 75 minutes in duration.

The IDP camps' community centre was a venue for the intervention delivery, and the experts requested further information on the two selected camps' comparability. We were able to supply them with evidence for the comparability of the camps.

Coping was not measured as an outcome, which they expected to see if Folkman's and Lazarus Stress Coping Model is a theoretical model, to underpin the ACD programme. This suggestion was considered, and coping was added as an outcome, and a Brief COPE scale was adopted for use.

Researchers recommended building the brief health educational content into each of the ACD sessions, rather than having it as a one-off addition. The 60-minute duration for brief health education seemed to contain a great deal of information, and they generally recommended offering more than one session specifically to the control group, otherwise non-specific. The rationale for providing the one-off education group should be strengthened. They further inquired whether there was any evidence that a one-off group with this content will help depression? What content has been adopted by previous studies with a similar intervention? Whether that brief health education was standard practice at the camps? They argued that having "me time" in a refugee camp may be particularly difficult, given the circumstances. For example, advising people to "take a vacation" seems inappropriate, because the camp residents might be feeling low and unable to go on a vacation. Similarly, going for a 5-km run with a "coach" seems impractical due to financial constraints.

The suggestions were considered, and brief health education was added to week 4 with the same materials as reinforcement. The educational content was modified and simplified using locally available resources for timely, effective communication. There is no empirical evidence for using the 10 stress busters developed by the National Health System; however, the developers used research evidence to warrant its application. We clarified that the argument of having "me time" in a camp is not about going on vacation, but rather having time to relax, irrespective of the individual's location. We agreed that

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going for a 5-km run with a "coach" seems impractical for the IDPs and removed this from the protocol.

Given that food is provided in the camps, the advice about nutritional intake could be modified to better suit the study setting, i.e., how much to eat and which foods to choose from the food delivered by aid workers. We argued that the government and other agencies supporting them with food were fully aware of their nutritional requirements, and considerations were taking during supply provision. Also, meditation/strength and the stretching plan needed instruction and facilitated practice. Will this be available in the camps? Considering the time and resource constraints, this content was removed. A "buddy" scheme is briefly mentioned, but no details are provided. This was modified and integrated into the item of having a "Me time" component in the brief health education.

Based on the comments mentioned above/concerns raised, the protocol was modified, and the revised protocol alongside the rating tool was sent for the second round of Delphi.

## 4.7.3.3. Second round Delphi

We restructured the ACD and brief health educational content based on the experts' recommendations in round one Delphi; items not suitable for IDPs were removed, and some were modified. Each expert received a second questionnaire with a summary of the comments from the other experts and was asked to review the items again. They were asked to rate each component of the ACD and brief health education. Experts could recommend changes or make new suggestions after reading the content. S-CVI and inter-rater agreement were calculated.

## 4.7.3.4. Results of second round Delphi

As shown in Table 10, we were able to established consensus at this stage: ACD programme items agreement 1) duration of time 75 minutes (100%), 2) method of delivery (100%), ACD specialist to deliver the intervention (100%), 4) community centre of the IDPs camp as a venue for the intervention (100%), content relevancy (80%), and programme appropriateness (100%). The S-CVI of the developed ACD content was .8. The overall inter-rater agreement was 93.33%, with free marginal kappa of .87 (95% CI .61, 1.00).

No	Items	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Number in agreement	Item content
1	Duration of time	Х	Х	Х	Х	Х	5	1
2	(75 minutes) Method of delivery (face-to-face)	Х	Х	Х	Х	Х	5	1
3	Dance specialist to deliver the intervention	Х	Х	Х	Х	Х	5	1
4	The community centre of the IDPs camp as a venue for the intervention	Х	Х	Х	Х	Х	5	1
5	Content relevancy	0	Х	Х	Х	Х	4	.9
6	Appropriateness of the programme	Х	Х	Х	Х	Х	5	1
Propo mean	rtion relevant (i.e. expert proportion)	0.9	1	1	1	1	S-CVI/UA number o considered r the expert jud number of i CVI equal to number of ite = .8	= (the f items elevant by lges (or the tems with 1/the total ms, i.e. 5/6

Table 10. Dance Component of African Circle Dance (ACD) Programme

As shown in Table 11, the brief health educational items had 100% agreement each for the 60-minute duration, face-to-face delivery mode, community centre as a venue for

the intervention, and programme appropriateness, with only the content relevancy scoring 80%. The S-CVI of the developed brief health educational content was .8. The overall interrater agreement was 93.33%, with free marginal kappa of .87 (95% CI .61, 1.00). This enabled us to develop the final intervention protocol and practically apply it to IDPs (Chapter Seven).

No	Items	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Number in agreement	Item content validity
1	Duration of time (60 minutes)	Х	Х	Х	Х	Х	5	1
2	Method of delivery (face- to-face)	Х	Х	Х	Х	Х	5	1
3	Mental health nurse to deliver the intervention	Х	Х	Х	Х	Х	5	1
4	The community centre of the IDPs camp as a venue for the intervention	Х	Х	Х	Х	Х	5	1
5	Content relevancy	0	Х	Х	Х	Х	4	.9
6	Appropriateness of the programme	Х	Х	Х	Х	Х	5	1
Propo	rtion relevant (i.e. expert proportion)	0.9	1	1	1	1	S-CVI/UA number of considered r the expert juc number of i CVI equal to number of ite = .8	= (the f items elevant by lges (or the tems with 1/the total ms, i.e. 5/6

Table 11. Brief Health Education Component of African Circle Dance (ACD) Programme

# 4.7.4. Final ACD programme protocol

Table 12 shows the summarised ACD programme intervention protocol with the

respective duration and content for both the ACD and brief health education components.

Time	Session Name	Content			
Brief health education (60 minutes)					
5 min	Check-in session	Self-introduction, activity introduction			
40 min	Education session	Lecture on facts relating to the psychological effects of stress, how to cope in an IDP camp, resources available in the IDP camp, and coping skills depicted on the "10 stress Busters" (National Health System, 2017).			
5 min	Clarification session	Answer questions raised by the participants			
10 min	Oral quiz session	Evaluate the participants' knowledge			
Dance intervention (75-minutes)					
5 min	Check-in session	Self-introduction, activity introduction			
10 min	Warm-up session	Preparation for the dance			
50 min	ACD session	Dance exercise under the teaching and supervision of a dance specialist			
10 min	Cool down session	Preparation to end the dance			

ACD: African Circle Dance-

## 4.8. Study Limitations

The heterogeneity among the included studies was high which might be due to distinct dancing protocols where different instruments and control groups were used. Further, the participant's characteristics also differ as the study combined healthy subjects, those with medical conditions, and stress. The different types of dance might also be a source of heterogeneity. Therefore, caution should be applied in comparing the studies effects or their comparison.

## **4.9. Study Implications**

The systematic review generated evidence on the dance intervention effects on depressive symptoms, stress, anxiety, and insomnia. Evidence from this review contributes to informing ACD dance intervention protocol by identifying appropriate dosage, frequency, and duration. The developed evidence-based ACD intervention protocol, which was validated through a Delphi process, might be a valuable tool that can be replicated elsewhere to help manage psychological distress (e.g., depressive symptoms, anxiety, stress, and insomnia) and to promote emotional and dysfunctional-focused coping strategies. Therefore, researchers/policy makers can adopt and replicate this study using the already developed intervention protocol.

### 4.10. Chapter Summary

This chapter was designed for ACD programme protocol development using two methods, i.e. systematic review, meta-analysis, and expert panel. The first method, i.e. systematic review and meta-analysis, covered the protocol registration, eligibility criteria, information sources, search, study selection, data collection process, data items, risk of bias in individual studies, and a summary of measures and a synthesis of the results. The results achieved were stated given the outcomes of the study selection, study characteristics, risks of bias within studies, and the individual study results to answer the specific objective #1. To identify the intervention components of the effective dance intervention and the outcome measures used in the study, a TIDieR checklist was applied. The brief health educational programme on stress management was based on the 10 stress busters developed by the National Health System. This is to answer specific objective #2. The Delphi method was used for the ACD protocol development to answer specific objective #3. The next chapter will describe the validation of the instrument (Phase Two).

#### **Chapter 5. Validated Instruments (Phase Two)**

Internal displacement is a common problem seen in Sub-Saharan Africa, and the majority of displaced persons are from rural communities with low levels of literacy (Lanciotti, 2019; Owoaje et al., 2016). The IDP population in Africa speaks different languages, and the majority do not understand English (Schmidt et al., 2019). This warrants the translation and cultural adaptation of the outcome measures into the Hausa language for use in the ACD programme, to ease understanding of the content by study populations and ensure accurate outcome measurements. Three outcome measures were identified in the literature to assess mental health problems (i.e., depressive symptoms, anxiety, stress, and insomnia) and coping strategies (emotion, problem and dysfunctional-focused coping styles). The outcome measures were the DASS-21, ISI, and the Brief COPE scales.

This study was designed to achieve translation and adaption of the tools. The applications and approval for translation and use of the DASS-21, ISI and Brief COPE scales from the respective copyright owners, and the translated tools, can be found in Appendix 8, 9, 10, 11, 12 and 13, respectively.

## **5.1. Specific Objectives**

1. To translate and adapt the DASS-21, ISI, and Brief COPE instruments into the Hausa language.

## **5.2. Instruments to be validated**

## 5.2.1. Depression anxiety stress scale

DASS-21 is one of the most widely used tools for evaluating mental health problems across the globe (Oei et al., 2013). The English version of the DASS-21 has been

internationally validated across cultures. It has been translated into 52 languages worldwide (Psychology Foundation of Australia, 2018). The scale comprises 21 items designed to assess the three states of emotion, i.e. depression, anxiety, and stress, with each having seven assessment items (subscale) (Lovibond & Lovibond, 1995; Oei et al., 2013). Items of the scale have four response options for selection: 0= never, 1= sometimes, 2= often, and 3= almost always (Oei et al., 2013). DASS-21 has 21 items, seven for each of its three subscales, i.e., DASS-21 Depression subscale, DASS-21 Anxiety subscale, and DASS-21 Stress subscale. The total subscale scores are obtained by summing the scores for the relevant items (Oei et al., 2013). Each of the three subscales of the DASS-21 has a total score of 21, which multiplied by 2 becomes 42; the reason for multiplying was to obtain a score similar to that of DASS-42 (Beaufort et al., 2017). Therefore, the total subscales score for each ranged from 0-42 (Beaufort et al., 2017).

The psychometric properties of all translated versions (non-English and English) have shown high internal consistency with Cronbach's alpha within a range of .82 - .9 (Silva et al., 2016; Sinclair et al., 2012). The intra-class Correlation Coefficient (ICC) for the anxiety/stress and depression subscales was .82 and .86, respectively (Silva et al., 2016; Sinclair et al., 2012).

In terms of validity, the DASS-21 depression subscale correlated positively with the Positive Affectivity scale (r=.-.49, p<.0001), and the Quality of Life Index (r=-.58, p<.0001), DASS-21 Anxiety subscale (r=.44, p<.0001), DASS-21 Stress subscale (r=.63, p<.0001), and Penn State Worry Questionnaire (r=.52, p<.0001) (Gloster et al., 2008). Conversely, a negative association was seen with the Negative Affectivity Scale (r=.60, p<.0001) (Gloster et al., 2008).

DASS-21 Anxiety subscale was positively correlated with the DASS-21 Stress subscale (r=.54, p<.0001), Beck's Depression Inventory-II (r=.47, p<.0001), Beck's Anxiety Inventory (r=.73, p<.0001), Penn State Worry Questionnaire (r=.34, p<.0001), and Negative Affectivity Scale (r=.57, p<.0001) (Gloster et al., 2008). In contrast, a negative association was seen with the Quality of Life Index (r=-.19, p<.01) and Positive Affectivity Scale (r=.19, p<.01) (Gloster et al., 2008).

The DASS-21 Stress subscale correlated positively with the Beck's Depression Inventory-II (r=.62, p<.0001), Beck's Anxiety Inventory (r=.59, p<.0001), Penn State Worry Questionnaire (r=.57, p<.0001), and Negative Affectivity Scale (r=.74, p<.0001). On the contrary, it was negatively associated with the Quality of Life Index (r=-.33, p<.0001) and the Positive Affectivity Scale (r=-.24, p<.001) (Gloster et al., 2008).

For concurrent validity, the DASS-21 measure could have good discrimination for both non-clinical and clinical samples and other groups (Antony et al., 1998). To date, no one has translated and validated the DASS-21 into Hausa, the second most commonly spoken language in Africa (Oyeyemi et al., 2014).

## 5.2.2. Insomnia severity index

Insomnia can be assessed using objective or subjective approaches. The most valid and reliable process of obtaining information on sleep frequency and duration was with an objective approach using actigraphy or polysomnography. However, it could be a costly approach that might require creating an environment (artificial) for sleep (Petit et al., 2003). The subjective method is the most widely used cost-effective process that requires daily records of an individual's sleeping patterns, including the time a person goes to bed, sleep onset, and awakening frequency; however, this process has a limitation of not providing the impact of insomnia on an individual's functioning and daily wellbeing (Monk et al., 2000). Some tools, like the Epworth Sleepiness Scale (ESS) and the Pittsburgh Sleep Quality Index (PSQI), have been developed to assess sleep problems. However, they subjectively measure daytime sleepiness, sleep disturbances, and sleep quality; as such, their design is not specifically tailored for insomnia (Cho et al., 2014).

The Insomnia Severity Index (ISI) tool is a valid and reliable tool tested over time. It has an advantage over other screening tools as it shortens the assessment time for both practitioners and consumers of healthcare services (Morin et al., 2011). It has been translated into and validated in Spanish, Iranian, Arabic, Italian, Chinese, Swedish, Danish, Persian, Korean, German, French, Czech and Hindi, and has demonstrated excellent psychometric properties (Chahoud et al., 2017; Clemente et al., 2021; Dieperink et al., 2020; Dragioti et al., 2015; Dudysová et al., 2017; Fernandez-Mendoza et al., 2011; Khosro et al., 2014; Lahan & Gupta, 2011; Suleiman & Yates, 2011; Yazdi et al., 2012). Currently, there is no study on its psychometric properties in Africa, specifically in the Hausa language.

ISI scale is a self-reported measure used for gathering data on sleep problems using low cost and human labour to obtain client information; it also identifies client perceived insomnia consequences (Morin et al., 1993; Smith & Trinder, 2001). It could measure the perceived severity of sleep problems, the pattern of sleep disturbances and its effects on the subjects. ISI is made up of seven items (Morin et al., 2011). The first three questions have five response options in a row with 0= none, 1= mild, 2= moderate, 3= severe, 4= very severe (Bastien et al., 2001). Questions 4-7 also have five items per row with 0= not at all noticeable, 1= a little, 2= somewhat, 3= much and 4= very much noticeable (Bastien et al., 2001). The original scale has three subscales of 1) sleep difficulties (i.e., sleep onset, its maintenance and early morning awakening) consisting of items 1, 2, and 3, 2) impact of insomnia (i.e., sleep interference, noticeability and distress) with items 5, 6, and 7; and 3) sleep satisfaction or dissatisfaction (i.e., sleep onset, its satisfaction and associated distress) with items 1, 4, and 7 (Fernandez-Mendoza et al., 2011).

The scale was found to have an excellent internal consistency with Cronbach's alpha of .90 and .91; the internal consistencies of its three subscales were also reported: 1) sleep dissatisfaction with Cronbach's alpha of .75, 2) the impact of insomnia with Cronbach's alpha of .81, and 3) nighttime sleep difficulties with Cronbach's alpha of .60 (Fernandez-Mendoza et al., 2011; Manzar et al., 2018; Morin et al., 2011). These were reported by older adults; including those with prostate cancer, clients in a Persian sleep clinic, and Chinese adolescents (school-based) (Chung et al., 2011; Khosro et al., 2014; Savard et al., 2005; Yu, 2010). The tool demonstrates adequate concurrent validity compared with the data for corresponding sleep diary with r=.32 to .55, p<.05, and .50 to .91, p<.05 for baseline and post-intervention, respectively (Bastien et al., 2001).

#### 5.2.3. Brief COPE scale

Coping was a strategy to reduce distress due to negative life experiences (Gaudreau, 2018). The Brief COPE scale is also called the coping inventory and can determine an individual's coping style (Carver & Carver, 1997; Carver et al., 1989). The tool was developed by Carver based on the Lazarus and Folkman coping theory (Jacobson, 2005; Lazarus & Folkman, 1984). It was used in healthcare settings to assess how people respond to a specific diagnosis. It equally assesses how people react to life adversities, such as conflict, disasters, distress, and other stressors. The English version has been translated and

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validated in many languages, including French and Portuguese, among others (Dias et al., 2009; García et al., 2018; Kapsou et al., 2010; Muller & Spitz, 2003). It has also been translated into Swahili, the most commonly spoken language in Africa, and Kikuyu (Kimemia et al., 2011). However, the Hausa translated version is lacking.

The tool has 28 items, 14 subscales (Brown et al., 2005), and reflects two coping styles, i.e. avoidant coping (maladaptive) and approaches (adaptive) coping (Faronbi, 2018). Coping styles were equally presented, with three different types, i.e., emotion-focused, problem-focused, and dysfunctional-focused coping styles (Cooper, Katona, & Livingston, 2008; Faronbi, 2018). The Brief COPE scale has four response options in the form of a Likert scale with 1= I haven't been doing this at all, 2= A little bit, 3= A medium amount, and 4= I've been doing this a lot (Carver & Carver, 1997).

The emotion-focused coping style consists of the subscales (i.e., humour, emotional support, religion, positive reframing, and acceptance); dysfunctional-focused style (i.e., self-blame, self-distraction, substance use, venting, denial, and behavioural disengagement); and problem-focused coping (i.e., planning, active coping, and use of instrumental support) (Faronbi, 2018). Evidence has shown that the factors listed above (coping subscales) can either be problematic or adaptive; therefore, coping styles can be adaptive or maladaptive (Carver & Carver, 1997). The avoidant coping consisted of 12 items (i.e., six subscales) with a possible score of 0-36, with higher scores signifying higher usage (Moore et al., 2011). The avoidant (maladaptive) coping style comprises the subscales of substance use, self-distraction, venting, denial, behavioural disengagement, and self-blame (Carver et al., 1989; Meyer, 2001). The avoidant coping domain is correlated with poor health (physical) for those with medical conditions and was less

effective for managing anxiety (Eisenberg et al., 2012), and strongly associated with mental health disorders such as depression (Meyer, 2001). The adaptive (approach) coping style consisted of eight subscales (16 items) with a possible score of 0 to 48, with higher scores indicative of more significant usage (Moore et al., 2011). The approach (adaptive) coping style consists of the subscales of acceptance, active coping, humour, religion, planning, seeking emotional and informational support, and positive reframing (Carver & Carver, 1997; Moore et al., 2011). This style can promote health in the long term (Meyer, 2001). In contrast, Carver et al. (1989) did not categorise religion and humour into either the approach or avoidant style. Meanwhile, the adaptive coping style is a more helpful response to life adversities, practical adjustment, stable emotional response, and good physical outcomes.

The coping dimension is diverse and situationally specific. The reliability of the Brief COPE scale was tested and was found to have good internal consistency with Cronbach's alpha of .70 for the overall scale (Mohanraj et al., 2015). The internal consistency for the 14 Brief COPE subscales was found to have a Cronbach's alpha in a range of .44 to .89, with the highest being for the subscale of substance use. In contrast, the behavioural disengagement subscale has the lowest. However, the scale has 2-item 14 subscales, and almost 11 of the 14 subscales have Cronbach's alpha >.5 (Jacobson, 2005). In a different study, the 14 subscales have a Cronbach's alpha ranging from .50 to .90, with the venting subscale having the lowest and the substance use subscale the highest (Carver et al., 1989). The three constructs of emotion, problem and dysfunctional-focused coping styles were also tested. For the emotion-focused, problem-focused, and dysfunctional-focused coping strategies, Cronbach's alpha was .72, .84, and .75, respectively (Cooper,

Katona, & Livingston, 2008). We could not identify any psychometrically tested study that classified the brief COPE scale items into adaptive or maladaptive coping styles.

A Brief COPE scale was also tested for validity. A positive correlation was seen between the Substance Use Subscale and Perceived Stress Scale (r=.20, p<.001); Emotional Support Subscale with Subjective well-being (r=.22, p<.001); Planning Subscale with Subjective Well-being (r=14, p<.001); Acceptance Subscale with Subjective Well-being (r=11, p<.001); Self-distraction Subscale with Perceived Stress Scale (r=.14, p<.001); Self-blame Subscale with Perceived Stress Scale (r=.18, p<.001); Behavioural disengagement Subscale with Perceived Stress Scale (r=.20, p<.001); Venting Subscale with Perceived Stress Scale (r=.06); and positive reframing Subscale with Subjective Well-being (r=.12, p<.001); Instrumental support with the Perceived Stress Scale (r=.13, p<.001); Active Coping Subscale with Subjective Well-being (r=.23, p<.001) (García et al., 2018). Except for the Humour Subscale, which correlates negatively with both Subjective Well-being (r=-.03), and Perceived Stress Scale (r=-.11, p<.01); and Religion Subscale that positively correlates with both Subjective Well-being (=.12, p<.001), and Perceived Stress Scale (r=.17, p<.001), all other subscales not mentioned above had negative correlations with either Perceived Stress Scale or Subjective Wellbeing, with r values in a range of -.009 to -1.13 (García et al., 2018).

The construct validity of the Brief COPE subscales shows that the emotion-focused style was significantly correlated with the number of confidants but not with attachment score; and a dysfunctional-focused style is associated with higher avoidant attachment scores (Cooper, Katona, & Livingston, 2008). Problem-focused coping correlated significantly with avoidant attachment and Alzheimer's Disease Co-operative Study

Inventory-ADL scores (Cooper, Katona, & Livingston, 2008). The convergent validity of the Brief COPE scale was assessed, together with a theoretically relevant variable considering the relationship of coping and depression; the validity was tested using the two coping styles (i.e., maladaptive and adaptive) in comparison to depression, which was assessed using the Clinical Interview Schedule Revised (Mohanraj et al., 2015). The overall mean score for the adaptive coping style was  $2.72 (\pm .44)$  and  $1.8 (\pm .36)$  for the maladaptive coping style (Mohanraj et al., 2015).

#### **5.3.** Methods

There are three outcome measures to be translated and validated into the Hausa African language. Referring to the framework developed by Beaton et al. (2000), we conducted the translation and adaptation process through six stages, namely: 1) forward translation, 2) translation synthesis, 3) backward translation, 4) expert committee review, 5) pretesting, and 6) submission and appraisal of the translation process by the developers. This was done to identify content validity and the items' functional, operational, semantic, measurement, and conceptual equivalence.

#### 5.3.1. Translation and adaptation process

There was a need to use appropriate and reliable tools in phase III of this study. With this in mind, the researchers adopted DASS-21 to measure the primary outcome of depressive symptoms. For secondary outcomes, two subscales of DASS-21 were used to measure anxiety and stress, ISI for sleep disturbances, and Brief COPE for coping. As shown in Figure 14, the translation was done in six stages using the guideline developed by Beaton and colleagues for self-reported measures (Beaton et al., 2000).



Figure 14. Process of cross-cultural adaptation of tools

# 5.3.1.1. Stage I Translation (forward translation)

The translation process followed the stages for cross-cultural adaptation, starting with translating the tools into the Hausa language by two translators (informed and uninformed) (Beaton et al., 2000). Two independent bilingual translators were recruited to translate the three tools. One of the translators was informed of the essential process of translating the tool, while the other was a naive translator (blinded). A naive translator is someone who is not knowledgeable about the tool or its construct (Beaton et al., 2000). Two criteria were used for selecting the two translators. The first translator was a knowledgeable healthcare professional with Hausa as his first language and a good understanding of English. The second translator was a language specialist with no knowledge of medical terminologies nor the construct being studied, but who had a clear understanding of the linguistic and cultural nuances of the Hausa language. They avoided addressing professionals using jargon but instead focused on the audience (World Health Organisation, 2018).

#### 5.3.1.2. Stage II Synthesis

The written reports from the translators were collected, and any disagreements between the two translated versions were resolved by translation procedure/discussion with comments from the expert panel (Beaton et al., 2000). The panel of experts was constituted of six members, including the two forward translators, one mental health specialist, one psychologist, one general practitioner, and one language specialist. Utilising the English version of the three instruments and the translated copies, a single preliminary transcript was generated for each tool by the expert committee (Beaton et al., 2000). The committee resolved observed discrepancies and ambiguities by discussion. A written report showing the process of synthesis, issues raised, and resolution achieved was completed (World Health Organisation, 2018).

### 5.3.1.3. Stage III Backwards translation

These are followed by back translations of the three tools to check for validity using Stage II's synthesised copy (Beaton et al., 2000). Two separate independent bilingual translators with no prior knowledge and involvement in Stage I were recruited to translate the English language tools (World Health Organisation, 2018). Both translators were blinded to the concepts explored in DASS-21, ISI and Brief COPE. This is done to locate any translation errors (conceptual) or inconsistencies that might occur in the course of translation (Beaton et al., 2000).

# 5.3.1.4. Stage IV Expert committee review

Both the two backwards-translated versions of the instruments obtained in stage III by the two separate bilingual translators will be analysed and evaluated by the expert

committee. An 80%-100% agreement must be achieved before accepting the final copy, emphasising cultural and conceptual equivalence (World Health Organisation, 2018). An expert panel established the face and content validity of the three tools' translated versions. The expert panel, with 11 members, including the translators (backwards and forwards), healthcare professionals (two mental health experts, one psychologist, one general practitioner), two language professionals, and the methodologist, was invited to conduct a face-to-face review of the translated instruments (World Health Organisation, 2018). The experts critically reviewed the items on each scale. They provided comments for improving the relevance of the item to their respective domains. The expert panel evaluated the translated instruments for clarity and whether the authentic meaning and content were maintained. All comments were noted, and changes were effected. After completing the reviews, we requested each member of the panel to independently score each item based on its relevance using a checklist. The checklist for content validity was developed based on the recommendation of Polit and Beck (Polit & Beck, 2006a). The items in the pre-final copy of the three instruments were evaluated on a 4-point Likert scale (1= irrelevant, 2= mostly relevant, 3= relevant and 4= very relevant). The panellists were required to submit the score sheet to the researcher at completion. Content Validity Index (CVI) was then calculated for each item of the tools. The items' ratings were grouped into two categories, i.e. ratings of '1' or '2' were considered 'irrelevant', while scores of '3' and '4' were regarded as 'relevant'. The proportion of 'relevant' scores assessed the CVI of individual items. For the whole scale's CVI score, the CVI mean of the items in the corresponding scale was calculated. A CVI score of .8 or more is considered an indication of good content validity (Polit & Beck, 2006a).

The expert committee was reconstituted to consolidate all of the versions, thus coming up with the pre-final copy for field testing (Beaton et al., 2000). At this stage, the committee looked at the semantic, idiomatic, experiential, and conceptual equivalence of all of the translated versions (Beaton et al., 2000).

## 5.3.1.5. Stage V Pretesting

It has been recommended that the pre-final copy of the translated instruments should be tested among 10-40 subjects (Beaton et al., 2000). We, therefore, tested the prefinal copy of the translated versions using 30 IDPs aged  $\geq 18$  years, living in the metropolis of Maiduguri. We assessed them for fluency in the Hausa language by asking them to read a text, and we also conversed with them. They were asked to review the Hausa version of the three scales (DASS-21, ISI, and the Brief COPE) and identify difficult or not easily understood phrases. The three scales were dichotomised for rating purposes with "clear or unclear" options. The participants were asked to rate each tool. Those who rated an item as unclear were asked to elaborate on whether they understood the meaning of the item and anything that needed changing. We set up a rule that each item must achieve an inter-rater agreement score of 80%, and any with at least a 20% unclear rating must be re-evaluated (Beaton et al., 2000). This was done to strengthen the semantic, conceptual, and content equivalence of the translated tools, and improve the structure of sentences used in the items and instructions for easy understanding before the psychometric testing (Bujang et al., 2018). We interviewed the subjects to determine their perception of each instrument and any problematic phrases (World Health Organisation, 2018). Difficult words or phrases were documented and forwarded to the members of the expert panel that was previously constituted for their review. Any panel member who was not clear with any phrase was asked to elaborate and given the suggestion to rewrite it using better, clearer language. All of the experts' final recommendations were later adopted after a discussion between them and the researcher. The panel later rated the tool again, and the kappa coefficient was calculated. This was done to achieve information, response and item format clarity, and content-related validity as part of the preparation for testing their psychometric properties (Bujang et al., 2018).

#### 5.3.1.6. Stage VI Submission and appraisal

The original developers were notified and kept in touch with the committee at this stage (Beaton et al., 2000). All reports/forms were submitted to them for their auditing of the translation and adaptation process (Beaton et al., 2000).

#### 5.3.2. Data analysis

Except for the face and content validity, the other six equivalences were based on Herdsman's Universalist model, which recommends six types of equivalences (i.e., items, functional, operational, semantic, measurement, and conceptual) (Herdman et al., 1998). Refer to Stage IV Expert's committee review for the CVI calculation for the content-related validity. The mean Item-CVI was calculated using the number of experts giving a rating of 3 and 4 to the relevancy of each item divided by the total number of experts (Shi et al., 2012). Experts rated each item of the respective tools as clear=1 and unclear=0. The I-CVI scores were in a range of 0-1, and any item with a score within > .79 was considered relevant, those whose score ranged between .70 and .79 were recommended for revision, while any item with a score <.70 will be eliminated (Zamanzadeh et al., 2015). Content equivalence was achieved using the Fleiss marginal multi-rater kappa coefficient agreement with an acceptable coefficient level of .80-.90 (i.e., 64% -81%) agreement (McHugh, 2012). The 80% inter-rater agreements further determine the conceptual equivalence of the translated tools (Sousa & Rojjanasrirat, 2011).

The reliability of the instruments was calculated. In particular, the internal consistency of the three tools (DASS-21, ISI & Brief COPE) was examined using Cronbach's alpha. Values of Cronbach's alpha > 0.7 indicate acceptable internal consistency (Polit & Beck, 2006b). Test-retest reliability was calculated using the Intraclass Correlation Coefficient (ICC), at 95% Confidence Interval (CI) (Polit &Beck, 2006b). An ICC score of <0.40 was considered poor, 0.40 to 0.59 as fair, 0.69 to 0.74 as good while a score between 0.75 and 1.00 was excellent (Polit & Beck, 2006b). The one week is selected because individual emotions swing with time, and there will be a progressive decrease of retest correlation as the interval elongates (Anastasia & Urbina, 1997). The ICC was calculated using the ICC for the average measures, and the 'average measures ICC' was used because the study involved six raters.

## 5.4. Results

## 5.4.1. The content validity of the translated tools

The three scales were reviewed by 11 experts using face-to-face contact at the committee level, and they rated the scales and their respective items. As most papers report either the I-CVI or S-CVI, we reported only the I-CVI but not both. The I-CVI scores for the DASS-21 Hausa were in a range of .9 to 1.0. Twenty items had an I-CVI = 1.0, and one item had I-CVI=.9 (Appendix 14). The ISI Hausa has an I-CVI score in the range of .9 to 1.0. Six items had an I-CVI= 1.0, and one item had I-CVI=.9 (Appendix 15). The Brief

COPE Hausa scale had an I-CVI score in a ranged from .9 to 1.0. Twenty-seven items had an I-CVI= 1.0, and one item had an I-CVI=.9 (Appendix 16).

#### 5.4.2. Semantic equivalence

During the expert committee review, all seven items of the ISI Hausa and the 28 items of the Brief COPE Hausa scales were approved without modification. In evaluating the meanings (referential), we achieved more than 80% equivalence for most items that are satisfactory. However, there were some challenges with the DASS-21 scale translation because of the unclear nature of the Hausa language's emotional concept. Some items (i.e., 1, 3, 8, 13, and 18) of the translated DASS-21 Hausa were identified to be given more attention during the first expert panel review to make it more colloquial. These items were then revised by a discussion of the translation process by the expert panel. The five items were discussed at the second meeting of the expert panel, modified and tested with cognitive interviews with 12 IDPs, who were the population of interest. There was no Hausa phrase for "wind down," i.e., item #1; we, therefore, used "cool down" instead to reflect the original conceptual meaning. We equally modified item #3, "positive feeling", to "good feeling", due to the lack of a Hausa definition of the word "positive". There was no Hausa meaning for the term "nervous energy," i.e., item #8; therefore, the expert panel recommended the use of "nervousness". Item #13 was also changed from "felt downhearted and blue" to "dispirited and heartbroken". To reflect the original item meaning better, we used the phrase "easily annoyed" in place of "touchy" in item #18.

## 5.4.3. Conceptual and Item equivalence

The evaluation of the items and conceptual equivalence showed that the dimensions of the DASS-21 Hausa, ISI Hausa, and Brief COPE scales could be used in Hausa African society. The free marginal kappa for the DASS-21 was .98 (95% CI .95, 1.00) with 99.13% overall agreement. The ISI scale has a free marginal kappa of .95 (95% CI .85, 1.00), with an overall percentage agreement of 97.40%. The Brief COPE scale has an overall percentage agreement of 99.35%, and the free marginal kappa was .99 (95% CI .96, 1.00).

# 5.4.4. Functional equivalence

We deduced from the evidence generated from the equivalences (i.e., face and content validity, semantic equivalence, conceptual and items equivalence, and measurement equivalence seen in the construct validity and reliability measurements) and concluded that the scales were functional.

# 5.4.5. Operational equivalence

The study results showed that the Hausa versions of the DASS-21, ISI, and Brief COPE scales were suitable for psychometric testing.

## 5.4.6. Reliability of the DASS-21 Hausa scale

The internal consistency of the DASS-21 scale was .89 Cronbach's alpha. The test-re-test reliability was good with the ICC values of .78, .79, and .84 for the subscales of depression, anxiety, and stress respectively.

## 5.4.7. Reliability of the ISI Hausa scale

The ISI scale had an internal consistency with a Cronbach's alpha of 0.95, and the test-re-test has an ICC value of .94. The subscales of Insomnia severity and impact of insomnia has an ICC of .96 and .91, respectively.

## 5.4.8. Reliability of the Brief COPE Scale

The Brief COPE total has a Cronbach's alpha of ( $\alpha$ =.96). The Cronbach's for the subscales of emotion-focused coping, problem-focused coping, and dysfunctional-focused coping styles were .92, .97, and .92, respectively. The test-re-test has an ICC value of .95, .91, and .91 for the subscales of emotion-focused coping, problem-focused coping, and dysfunctional-focused coping, respectively.

### 5.5. Discussion

To the best of our knowledge, this is the first translation study on the DASS-21, ISI, and Brief COPE scales using the Hausa language in the continent of Africa. Some changes were made to the items of the DASS-21 to address its cultural and linguistic inadequacies by keeping their original meaning. This study provides immense contributions to research in Africa by providing the DASS-21-Hausa, Brief COPE scale Hausa and ISI scale Hausa versions used among IDPs. This is important because no one has ever translated the DASS-21, Brief COPE, and ISI scales in Africa, in Nigeria to be specific, into the Hausa language.

To attain semantic equivalence, the expert panel recommended changes to five items of the DASS-21. The item for "wind-down" was replaced with "cool down",

"positive feeling" with "good feeling", "felt downhearted and blue" with "dispirited and heartbroken", "easily annoyed" with "touchy", and "nervous energy" with "nervousness". The term wind down means to slow down or approach the end; therefore, the term cool down was retained. Because there was no Hausa meaning for "positive", and anything good in African society was considered to be good, the term "good feeling" was retained as recommended. Nervousness was considered a sensible individual response to a scary situation; it was, therefore, replaced with nervous energy, which is the excess energy seen in a person secondary to anticipation or anxiety, as both dealt with individual reactions. The feeling of downhearted and blue might be translated as feeling downhearted and sad or depressed. We, therefore, used terms that reflect both emotional state and sadness to better reflect the meaning in the African context. The phrase "easily annoyed" refers to someone difficult to please; it was replaced with "touchy" because the term incorporates oversensitivity to issues, being easily upset or offended. The changes were made for better understanding. The items were conceptually relevant with almost perfect free marginal kappa and acceptable CVI scores.

The ISI Hausa and the Brief COPE Hausa scales items were conceptually relevant with almost perfect free marginal kappa and acceptable CVI scores. The result indicates that the ISI-Hausa and the Brief COPE Hausa are culturally relevant to IDPs. There were no translation problems observed, and their content validity was rated as "very good".

Our findings re-affirms the excellent internal consistency of the DASS-21 scale seen in previous studies (Bilgel & Bayram, 2010; Rekha, 2012; Tran, Tran, & Fisher 2013; Pezirkianidis et al., 2018; Le et al., 2017). On the contrary, Yusoff (2013) achieved a Cronbach's alpha < 0.7, which is not acceptable. However, this could be due to the samples

used (medical school applicants) who may likely not be in distress. The test-retest reliability was calculated, and all the three subscales of depression, anxiety, and stress had an excellent ICC. The ICC for single measures were low signifying lower resemblance within items in the tool. It could also be due to variations amongst the subjects (Lee et al., 2012). Notably, single measure ICC only gives the reliability of a tool rated by just one of many assessors (Koo & Li, 2016). Meanwhile, it has for long been established that when the variance between participants is low, the ICC is assumed to be low (Nunnally, 2010).

The Hausa version of the ISI has met the reliability criteria for internal consistency with Cronbach's alpha > 0.7. This conforms to the previous research evidence that attained an acceptable internal consistency for the ISI scale (Dieperink et al., 2020).

The Cronbach's alpha of the Brief COPE-Hausa and its subscales (emotion, problem, and dysfunctional-focused) coping strategies was all within the acceptable limits, with excellent inter-rater reliability. The alpha level seen in this study appears to be better than that seen in persons living with HIV/AIDS, and those exposed to various stressful experiences (Mohanraj et al., 2015; García et al., 2018). This might be due to the variation in the subscales used for both studies and population differences.

## 5.5.1. Strengths of the instrument validation

The translation was done in consultation with the lay panel. The translation of the three measures was done in a multicultural setting, allowing it to be generalised to other similar populations.

#### 5.5.2. Value of the instrument validation

This is the first validation study of the Brief COPE, DASS-21 and ISI scales in the Hausa language in Africa, which is seen as an international language. Translating these tools was necessary for conducting research in Sub-Saharan Africa. It will help in avoiding the unnecessary exclusion of people from the study due to language barriers. It will help assess coping styles, psychological states, and sleep problems among Hausa speakers, the second most commonly spoken language on the continent.

# 5.5.3. Limitations of the validation of the instruments

The major limitation of this translation and adaptation study was that their factor structure and construct validity remains unknown. The construct validity is not known due to the lack of a Hausa translated version of the corresponding criterion instrument. Further, the factor structure was not investigated due to an inadequate number of samples.

#### 5.5.4. Study Implications

The translated tools (DASS-21, ISI and the Brief COPE scales) were culturally adapted. They can be valuable tools for psychological (i.e., depressive symptoms, anxiety, and stress), sleep, and coping research in the African continent or for other Hausa speakers worldwide. The tools might help researchers avoid eliminating subjects due to language barriers. Health practitioners working in a clinic, hospital or those working with bilateral agencies (e.g., non-governmental organisations) in a humanitarian context might use them as a screening tool to assess depression, stress, anxiety, insomnia, and coping strategies. Collectively, they can be helpful tools for use in planning health promotion activities.
The scales were only translated and adapted. Further studies should consider testing their psychometric properties by establishing their respective factor structure, reliability (test-retest, and internal consistency), and other forms of validity (concurrent, construct, or criterion-related).

# 5.6. Chapter Summary

This study phase was intended to translate and validate the tools measuring the ACD programme outcomes (main study). This study phase was for the translation and adaptation process. The next chapter will address the implementation phase of the African Circle Dance programme (Phase Three).

### **Chapter 6. African Circle Dance Programme (Phase Three)**

The TREND statement for reporting studies using nonrandomised designs will guide this study (Des Jarlais et al., 2004). We used the TREND statement for reporting clarity and use of non-RCT. The guideline is made up of 22 items governing effective reporting of behavioural interventions (Des Jarlais et al., 2004). In this study, it was used for reporting only the methods, results, and discussion sections of this study. The methods include the participants, interventions, objectives, outcomes, sample size, assignment method, and blinding; results consisted of participant flow, recruitment, baseline data, baseline equivalence, numbers analysed, outcomes and estimation, ancillary analysis, and adverse events, and the discussion covers the interpretation, generalisability, and overall evidence (Des Jarlais et al., 2004). The guideline was adopted for complete effective planning of design, outcomes, and reporting of our interventions. This guideline is important for assessing the efficacy and study validity, and it might also facilitate the synthesis of outcomes for use as a practical, evidence-based recommendation (Des Jarlais et al., 2004) Refer to Appendix 17 for the checklist.

## 6.1. Participants

### 6.1.1. Eligibility criteria

The inclusion criteria were: 1) adults age  $\geq 18$  years, 2) living in an IDP camp, 3) having depressive symptoms as assessed by DASS-21 depressive subscale score  $\geq 10$  (Parkitny & McAuley, 2010), and 4) having good mobility according to the modified functional ambulatory classification level 7 (i.e., an outdoor walker), as they can ambulate unaided (Chau et al., 2013). Subjects were excluded if they reported having chronic pain

in their lower limbs due to a high risk of falls (Löwe et al., 2004; MacKay et al., 2010). Further, subjects with mental and learning disorders, movement disorders or cognitive impairments were not suitable for participation because they may not understand the talk and cannot follow the ACD with other participants. Camp registration cards were used as evidence to confirm their age and displacement status before the screening.

## 6.1.2. Method of recruitment

We applied for permission to use the IDPs camps to the State Emergency Management Agency (SEMA) responsible for camp management and received approval. Information leaflets relating to the study were disseminated in the camps by placing them in different locations where IDPs gathered, inviting them to a dance programme screening. Convenience sampling was adopted, as the staff of the respective camps' psychosocial unit referred eligible subjects to the research assistants for screening. The screening was done in their respective camps of residence.

### 6.1.3. Recruitment settings

The IDP camps are communities where the displaced population often lives with their children and families (Toole & Waldman, 1993; Turner, 2016). Two IDPs camps were used: Teachers Village and Muna Garage IDPs camps located within the metropolis of Maiduguri, Borno state capital in Northeastern Nigeria. IDPs were admitted into the camp if the ongoing conflict had displaced them, and their location was verified to be affected by the SEMA. At the entry point, they were registered by the camp management office, and information on 1) location of origin, 2) place of displacement, 3) household level, 4) health records and needs were recorded. They were issued a health/ration card, to be used

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for collecting associated entitlements (Bentzen et al., 2008). In the camps, IDPs receive support in terms of shelter, healthcare, security/protection, and food. As the conflict is still ongoing, it is not certain when they will be discharged.

The Teacher's village camp has over 31,019 persons, 6,033 households with a high number of female-headed households, as well as unaccompanied elderly persons and children (International Organization for Migration, 2019; IOM & Emergency Tracking Tool, 2018). The population constituted mostly of people displaced from Monguno, Kukawa, and Magumeri local government areas (International Organization for Migration, 2019). This camp was located within the metropolis of Maiduguri, with an established security system that requires visitors/vehicular registration at the entry point. The inhabitants were occasionally issued an identification card for entry and exit, and most importantly, the camp has a fenced wall. The main risk/limitation of the Teacher's village camp was the congestion of people and insufficient shelter (United Nations Office for the Coordination of Humanitarian Affairs & 2019).

Muna Garage camp was located on the outskirts of Maiduguri metropolis on private land, covering a land mass of 397,000 m<sup>2</sup> with a population of 39,560 and 7,332 households (Appendix 18) (Displacement Tracking Matrix, 2017; United Nations Office for the Coordination of Humanitarian Affairs, 2020). The Muna Garage camp inhabitants were predominantly from Mafa, Konduga, and Dikwa local government areas. Contrary to the Teachers Village camp structure, the Muna Garage camp lacked a fence wall because it was private land, has porous borders with spontaneous sites, and extreme congestion of people due to frequent movement of the population; the camp had a risk of fire outbreaks, flooding, and security issues (Displacement Tracking Matrix, 2017; United Nations Office for the Coordination of Humanitarian Affairs, 2020).

Both centres were managed by the Borno State Emergency Management Agency (SEMA) with the support of United Nations agencies and non-governmental organisations (Kwajaffa, 2018). These organisations provide similar healthcare and other social services. Subjects were similarly encouraged to look for professional assistance regarding sickness using the camp health facility. There are facilities for recreation, schools, places of worship, and funeral services (Kwajaffa, 2018; Olufemi et al., 2019; Zannah et al., 2018). Two IDPs camps were selected to obtain convenience sampling; further, these were the camps where we could easily reach Hausa language speakers for the application of our translated tools.

#### **6.2.** The Interventions

## 6.2.1. Content

The ACD programme has two parts i.e., 1) brief health education and 2) African Circle Dance.

#### 6.2.1.1. Brief health education

The brief health educational intervention involved health education and information on stress management developed by the National Health System (National Health System, 2017). These are 10 key stress-busting suggestions that we grouped into two, each with five items. The first was on positive healthcare behaviours, and it includes 1) challenge yourself, 2) Taking self-control, 3) avoiding unhealthy habits, 4) being active, and 5) being smart, not hard working. The second component targeted the provision of support to help IDPs adjust their lifestyles to cope with stress, and it includes: 1) accept the things you can't change, 2) try to be positive, 3) have some 'me time', 4) connect with people, and 5) help other people (Salihu et al., 2021). Although it was challenging to keep track of adherence to all recommendations, we designed a simplified checklist for weekly records of recommended physical activities (Appendix 19). The brief health education details are described in Chapter four, pages 124-130.

#### 6.2.1.2. African Circle Dance

Refer to the summarised Table 8 in Chapter Four, and the ACD session begins with a five-minute briefing session. Participants were allowed to briefly introduce themselves at this stage, followed by introducing the day's activities, with subjects' conditions assessed at this stage (Salihu et al., 2021). A warm-up (stretching exercises) for 10 minutes followed this. ACD specialist introduced 50 minutes of ACD dance movements (Salihu et al., 2021). The band of musicians, consisting of a flautist and two drummers, played the Ganga-Kura drums and an Algaita (i.e., African traditional flute) (Salihu et al., 2021). The subjects danced in a circle in response to the music. The dance type was the popular Maliki dance commonly practised by the Kanuris in northeastern Nigeria. It began and ended in a circle. Subjects were partnered (i.e., male and female) (Salihu et al., 2021). The movements involved many body parts such as the head, hands, fingers, legs, and torso (Salihu et al., 2021). The musical rhythm was the key to the ACD movements, and subjects danced in a way that was akin to being in a conversation with the music, and vice-versa (Salihu et al., 2021). In the end, a 10-minute cool-down period was utilised, where the music and ACD movements were gradually slowed down. The same set of ACD movements, music, and procedure were employed repeatedly throughout the programme.

Adherence to the ACD programme was recorded as attendance, while another dance specialist monitored the intervention fidelity using a guided checklist at weeks 3, 4, 5, 6, 7, and 8. To standardised ACD intervention for treatment fidelity and replication, the following are needed: 1) space for dance, 2) experienced dance specialist, 3) a band of musicians (flautist, and at least two drummers, 4) validated dance protocol, and 5) a dance fidelity checklist.

### 6.3. Grouping

There were control and intervention groups. The subjects in the intervention group received both the ACD and brief health educational interventions, while the control group received only the brief health education. Considering all eligible participants had depressive symptoms, we deem it fit to give them a minimum intervention in line with the principle of the Helsinki declaration on medical research, hence the use of standard care (General Assembly of the World Medical Association, 2014). Further, brief health educational intervention was standard care for the IDPs (Kamali, et al., 2020).

### 6.3.1. Delivery Methods

The delivery method was entirely supervised face-to-face for both study groups.

### 6.3.2. Unit of Delivery

For convenience purposes, subjects in the intervention arm were divided into several groups, each having a minimum of 12 subjects (Salihu et al., 2021). This is to have effective control of the participants and equally reduce congestion at the venue. The ACD dance was conducted two days weekly, with each day covering four different sub-groups.

For the brief health educational intervention, the participants were divided into a subgroup of 20-50 subjects in both camps.

#### 6.3.3. Deliverer

The brief health educational intervention was delivered by a mental health nurse registered with the Nursing and Midwifery Council of Nigeria. A mental health nurse is an individual who is trained to care for people with a mental disorder, illness, or dysfunction (Hurley, 2009). The ACD intervention was delivered by a trained dance specialist employed by the Borno State Ministry of Art and Culture. A dance specialist is an expert with definitive information/knowledge on a specific dance needed by others and can show fundamental dance norms by exhibition (Academic Invest Webpage, 2020). Literature supports the fact that dance therapy is therapeutic if a therapist or specialist administers it (Exiner & Kelynack, 1994; Strassel et al., 2011).

### 6.4. Fidelity to maintain intervention delivery

The participants in both groups (intervention and control) received brief health educational interventions on stress management. The brief health educational component was delivered for 60 minutes, with only two sessions delivered at weeks 1 and 4 at the designated community centre within the camps (Table 13) (Salihu et al., 2021). At both weeks 1 and 4, the content was the same; however, re-administration at week 4 was for reinforcement purposes. Subjects in the intervention group received weekly African Circle Dance (ACD) movement with music for 75 minutes duration for eight weeks (Salihu et al., 2021). To encourage programme compliance, participants in both study groups were given an incentive - a travel allowance in the form of cash coupons (HK\$80).

### Table 13. Schedule for the intervention implementation

Groups	Week							
	1	2	3	4	5	6	7	8
Intervention	PE			$PE^1$				
	ACD	ACD	ACD	ACD	ACD	ACD	ACD	ACD
Control	PE			PE				

1 PE: Psychoéducation; ACD: African Circle Dance

# 6.5. Objectives

# 6.5.1. Specific Objectives

Evaluate the effects of ACD on outcomes of depressive symptoms, stress, anxiety, insomnia, and coping.

# 6.6. Hypothesis

With the ACD programme, subjects in the intervention group are more likely to cope well in terms of emotional, problem-focused coping, and therefore to perform better than the control group, with decreased depressive symptoms, anxiety, insomnia, and stress, and improved coping after eight weeks of interventions.

# 6.7. Outcomes

## 6.7.1. Primary outcome

The primary outcome of this study was depressive symptoms.

# 6.7.2. Secondary outcomes

Secondary outcomes include anxiety, stress, insomnia, coping (emotion-focused, problem-focused, and dysfunctional-focused subscales).

#### 6.8. Methods used to collect data

We developed a demographic data sheet for data collection. The demographic information collected includes participant gender, age, educational background, employment, and marital status before displacement. Clinical data included existing medical health problems, drug use, and a recent record of hospitalisation. Data related to a psychological profile included the validated scale as mentioned on pages 138-145, depressive symptoms, anxiety, insomnia, and stress, and coping strategies. All were collected before the study commencement (baseline) by trained research assistants (n=4) not involved in T1 and T2 assessments, with moderate reliability (ICC .66).

.All recruited research assistants had a minimum of degree qualification, the principal investigator trained them well, and they all are experienced data enumerators working with the non-governmental organisation within the metropolis of Maiduguri; we ensured their quality through their identity cards and data samples from their organisation and years of experience. The data were collected during the daytime.

Data were collected using self-report face-to-face interviewer-administered questionnaires, after obtaining ethical approval from the Hong Kong Polytechnic University (PolyU), SEMA and the Borno State Ministry of Health (MoH), followed by the subsequent completion of the cross-cultural adaptation of the outcome measures into the Hausa African language. The screening took place in the two respective camps; eligible subjects were then invited to participate in the ACD programme. After an explanation of the study, informed consent was obtained by the Research assistants (n=4). Baseline data were collected from the eligible participants before the programme's commencement.

Data were collected at baseline (T0) before the programme's commencement, and post-test (T1) data were collected the week immediately after the completion of the intervention. In contrast, follow-up (T2) data were collected the fourth week after the completion of the intervention. A trained research assistants (n=4) blinded to the group assignment, was recruited to collect data at T1 and T2.

#### **6.9. Information on Validated Instruments**

### 6.9.1. Depressive symptoms, anxiety, and stress

DASS-21 was a psychological scale made up of 21 items measuring the three states of emotions (depressive symptoms, anxiety, and stress). Each of the three subscales had seven items, and the total subscale scores can be obtained by summing them (Henry & Crawford, 2005; Oei et al., 2013). The scoring options were four, i.e. 0, 1, 2, and 3, and respondents were required to circle one in each row (Beaufort et al., 2017). Option 0 was for never, 1 for sometimes, 2 for often, while 3 represented almost always (Beaufort et al., 2017). The total subscale scores ranged from 0-42 (Beaufort et al., 2017). For interpretation, a score range was given. Depression subscale was said to be normal when a subject scored 0-9, mild 10-13, moderate 14-20, severe 21-27, and extremely severe 28+; the anxiety subscale was said to be normal when a score of 0-7 was achieved, 8-9 was mild, 10-14= moderate, 15-19 severe, and 20+ was interpreted as extremely severe; the stress subscale was said to be normal at a score of 0-14, and 15-18 was mild, 19-25 was moderate, 26-33 was severe while any stress subscale score  $\geq$ 34 was interpreted as extremely severe (Gomez, 2016). The scale has been psychometrically tested in the past and was found to be sound and reliable; its respective construct was found to have a high factor loading (Polit, 2010; Polit & Beck, 2006a; Vos et al., 2016). The anxiety, stress, and depression subscales have an Intracluster Correlation Coefficient (ICC) of .82, .82 and .86; Internal Consistency (IC) 80, 80 and 84; Standard Error (SE) 1.80, 1.80 and .80 (Silva et al., 2016; Sinclair et al., 2012). In the second phase of this study, we translated and validated this outcome measure into the Hausa African language. It was found to be psychometrically sound as well, the details of which can be found in Chapter five.

#### 6.9.2. Insomnia

This is a tool developed for the assessment of sleep difficulties (Morin et al., 2011). There are seven questions, with the first four assessing sleeping difficulties, while the last three questions evaluate the impact of insomnia on a subject. The scoring was done by selecting suitable options. The first three questions have five options arranged in a row for an individual's selection, ranging from 0 to 4, i.e. none to very severe intensity (Bastien et al., 2001). The remaining four questions have four equal options from 0 (not noticeable at all) to 4 (very noticeable) (Bastien et al., 2001). Total scores were obtained by summing all items. The score ranges for clinical insomnia were: 22-28 for severe intensity; 15-21 for moderate-intensity; 18-14 for suboptimal threshold, while anything between 0-7 indicates the absence of clinically significant insomnia (Shahid et al., 2011). The ISI scale was psychometrically tested and was found to have an excellent IC .90 and .91; the Exploratory Factor Analysis (EFA) outcomes were heterogeneous with Confirmatory Factor Analysis (CFA) favouring the two-factor model (Manzar et al., 2018). The scale has undergone cross-cultural adaptation into the Hausa language by the same team of researchers.

# 6.9.3. Coping

Coping was measured by the Brief COPE scale. The scale was developed by Carver using Lazarus and Folkman's stress-coping theory (Carver & Carver, 1997; Lazarus & Folkman, 1984). The Brief COPE scale has 28 items with 14 subscales (Carver & Carver, 1997). Based on the two available coping models, the tool can assess adaptive and maladaptive coping strategies and emotional, problem, and dysfunctional-focused coping strategies (Cooper, Katona, Livingston, et al., 2008; Meyer & Assessment, 2001). Most importantly, the avoidant domain is correlated with the poor physical health of subjects with established medical conditions and was less effective for anxiety management (Eisenberg et al., 2012). However, it has a strong association with depression (Meyer, 2001). The adaptive approach helps individuals respond to life adversities with a stable emotional response and practical adjustment. It was psychometrically tested and s found to have a good IC of .75, .72, and .84 for the dysfunctional-focused, emotional-focused, and problem-focused coping strategies (Cooper, Katona, Livingston, et al., 2008). The scale also underwent cross-cultural adaptation into the Hausa language by the same team of researchers.

### 6.10. Sample Size

The sample size was calculated based on a priori power analysis using a general linear mixed model (Kreidler et al., 2013). GLIMMPSE online tool was used, and was adopted because a similar model was used in the analysis (Kreidler et al., 2013). The effect size of a similar study estimating the effects of dance intervention on depression (d-.50): Control group at T0 (SD 11.98; Mean 18.62), at T1 (SD 9.74; Mean 16.92); Dance group at T0 (SD 12.35; Mean 16.00) at T1 SD (9.64; Mean 8.76) (Pinniger et al., 2012).

Estimating the intervention effect at T1 will sustain until T2. Setting the primary outcome (depression), the group numbers (n=2), repeated measures (n=3) with the level of significance set at .05, power at 80% (.8), we assume there will be 10% attrition at three months (Amico, 2009), and the minimum sample size required 182.

### 6.11. Assignment Method

Two IDPs camps were used to conduct this study (i.e., Teachers Village and Muna Garage camps) and were randomly assigned to the groups. The Teacher's Village was assigned to the control group, while Muna was assigned as the intervention group. We do not claim that our study is a true RCT as it does not meet the requirement of a true experiment due to the non-randomisation of Individuals, but camps. In true RCT, each person should have a chance of being randomly allocated to either intervention or control groups. Our study fulfils all RCT criteria but is weak in the randomisation process. Camps were assigned to groups using simple randomisation (coin toss method). Recently, a simple randomisation technique has been described as a quasi-randomised trial due to the utilisation of a single sequence of random assignments (Lai et al., (2021). Proper randomisation is required for research to be called RCT. Hence, the suitability of our title quasi-experimental study.

### 6.12. Blinding

Due to the difficulties of blinding the subjects and the interventionist, only the outcome assessors (n=4) were blinded to the group allocation. We ensured blinding of the assessors by concealing subject allocations, and they were also unaware of the interventions.

#### 6.13. Unit of Analysis

The analysis units were the groups of IDPs residing in the 1) Muna Garage and 2) Teachers Village camps. This is because the group of IDPs was allocated to treatment conditions. GEE model was used to account for random subject effects within groups.

## 6.14. Statistical Methods

### 6.14.1. Data Handling Method

Data cleansing was made possible to identify any discrepancies between the inputted data with the raw data, which may ensure the validity of our analysis (Portney & Watkins, 2009). For data accuracy, we conducted data cleansing by checking data with a hard copy for any five sets; if we found any systemic mistakes, we rechecked the data by description to locate any missing data. However, mean, standard deviation, frequency counts, minimums and maximums were used for continuous variables to check for extreme data. Unexpectedly low values in the column (minimum), signify wrong data entry (Pallant, 2020).

### 6.14.2. Description of the samples

Descriptive statistics of percentages, frequency, standard deviation, mean, median, and quartiles were used for samples description. To be specific, the sociodemographic data were summarised using frequency and percentages for categorical variables (gender, level of education, marital status, and employment) and continuous variables (age). Normality assessment was conducted for the continuous variables, and the inferential statistic of the Chi-square test was used to assess the homogeneity of the study sample. We compared the baseline differences using inferential statistics of Chi-square test and independent t-test for categorical (gender, education level, marital status, employment, age) and continuous (depressive symptoms, stress, anxiety, insomnia, coping: emotionalfocused, problem-focused, and dysfunctional-focused) variables respectively, with outcomes presented in mean and standard deviation.

#### 6.15. Process Evaluation of the ACD Programme

We assessed the perception of the ACD programme in terms of 1) satisfaction level, 2) usefulness of the brief health education on mood, 3) usefulness of the ACD on mood, 4) usefulness of the sharing sessions, and 5) frequency of the dance after the specialist session. We developed a checklist in the form of a Likert scale with five options. The ratings were from 0-4, with 0=not at all helpful, 1=slightly helpful, 2=moderately helpful, 3=very helpful, and 4=extremely helpful. The frequency of dance after the specialist sessions was also assessed with the response options of 0=never, 1=once weekly, 2=twice weekly, 3=three times weekly, and 4=more than four times weekly (Appendix 20).

# 6.16. Hypothesis Testing

IBM Statistical Package for Social Sciences (SPSS) version 20 (IBM Corp, Armonk, NY, USA) was adopted for data analysis. Since no previous study had investigated the effects of ACD interventions on outcomes, the study hypothesis was tested using two-tail. The outcomes (dependent variables) included depressive symptoms, anxiety, and stress, insomnia, with emotion-focused, problem-focused, and dysfunctionalfocused coping subscales. All of the above-stated outcomes variables were treated as continuous data. The independent variables include the groups (i.e., control and intervention), time (i.e., T1, T2, and T3), and the interactions between group and time. Covariates were identified and added to the equation.

The GEE model measures the effects of the ACD interventions on two groups of internally displaced adults (1= the control group) while (2= intervention group) across the three respective time points (T0, T1, and T2). The first time point is the [T0= baseline], which is used for reference purposes; [T1= post intervention] after the eight weeks of the ACD programme while [T2= follow-up] assessment at week 12 (i.e., four weeks post-intervention). The GEE model adopted can estimate the time and group variances and that of the group x time. The GEE results presented the group (intervention and control) variations at T0 (baseline), time effects on the control arm at T1 (post-intervention) and T2 (follow-up). Measurements and the impact of the ACD intervention across the three-time points for the control and intervention groups were simultaneously assessed considering the group x time interaction.

We determined the magnitude of effects using the Cramer's V (Ialongo, 2016). The scoring was interpreted as >.25 = very strong, .15 to .25 = strong, .1 to .14 = moderate, .05 to .09 = weak, and 0 to .04 as very weak (Akoglu, 2018).

### 6.16.1. The rationale for using the GEE model

To compare means changes for the continuous outcome variables ranging from depressive symptoms, stress, anxiety, and social support between two groups, we used the Generalized Estimating Equation (GEE) models. The GEE model was used with adjustments to the demographic and other confounding variables (biological and clinical records) to compare the differential changes in the continuous outcomes between the intervention and control groups, respectively. Using the GEE model has the advantage of accounting for intra-correlated repeated measures data, and can equally address missing data secondary to dropout or incomplete visits, provided they occur at random (Hua Yun & Roderick, 1999). The use of GEE has relevance to this study, because it has different time points, and it can give correct inferences by considering the repeated measurement correlations seen in within-participants (Lee et al., 2006).

#### 6.16.2. Identification of covariate variables

Before the analysis, we intend to control the potential confounders (covariates) in the demographic and outcome variables in this study. Covariate variables are part of the main interventional manipulation and quantified but considerably correlated with the dependent variables (Yzerbyt et al., 2004). Covariates are included to improve statistical power by removing the bias associated with the confounding variables (Yzerbyt et al., 2004). Confounders were identified as a threat to the study's internal validity and are addressed in two ways, i.e., by modifying the experimental design before data gathering or the use of statistical models after data collection (Yzerbyt et al., 2004). Because our design is premature, an adjustment was made by using the GEE model after data gathering (Pourhoseingholi et al., 2012). Two principles considered for adjusting confounders: 1) factors established to be associated with the dependent variables in the literature, and 2) significant outcome variables at baseline that were not balanced between the two study groups and are known to be associated. We take the confounders' account by treating variables with a p-value of <.1 at baseline as covariates to reduce the possibility of committing a type II error. GEE can simultaneously address the confounders (Hernández et al., 2006; Kahan et al., 2016; Pourhoseingholi et al., 2012).

We, therefore, searched the literature for the demographic covariates known to be correlated with the dependent variables; we found levels of education, gender, employment, age, and marital status to be associated with outcomes (Akhtar-Danesh & Landeen, 2007; Persaud & Persaud, 2016; Wang et al., 2020). There is a strong relationship between depressive symptoms and stress and anxiety (Hammen, 2005; Khan & Khan). Dysfunctional, problem, and emotion-focused coping is correlated with a high level of depression (Chou et al., 2011; Chou et al., 2017; Völlink et al., 2013). We then checked the baseline group differences for the outcome variables, and unbalanced outcome variables at baseline such as insomnia, depressive symptoms, and coping styles (emotion-focused, problem-focused, and dysfunctional-focused) were also identified and controlled.

### 6.16.3. Testing of assumptions

Several statistical assumptions using regression analysis involved linearity, normality, homoscedasticity of residuals and missingness.

#### 6.16.4. Normality

Refers to the use of absolute statistics of kurtosis, skewness, or Q-Q plots to assess each outcome variable in a study (Williams, 2020). We ran a descriptive statistic for kurtosis and skewness, and we requested a plot to visually inspect data distribution and identify reasons for non-normality if any (Peat & Barton, 2008). In the Q-Q plots, data that were clustered on a diagonal line indicate normal distribution (Liu et al., 2020). If the values plotted appeared with a straight line variation, it indicated they were not normally distributed (Peat & Barton, 2008). Again, we checked for the mean proximity to the median for possible skewness by looking at their closeness, and the smaller differences suggest normal distribution (Peat & Barton, 2008). Specifically, it was recommended that any variable whose skewness value falls within -1 to +1 was assumed to be normally distributed (Duffy & Jacobsen, 2005). Values between -1 to -3 and +1 to +3 indicate moderate skewness, with > 2 signifying severe skewness (Peat & Barton, 2008).

For affirmative purposes, we again doubled the standard deviations of the respective variables, subtracted, and added the amount to the values of the mean to obtain an estimated range at which 95% of the values should lie (Peat & Barton, 2008). For interpretive purposes, we looked at the two values estimated; if they are lower than the actual maximum and minimum values, the distribution was skewed to the right, signifying positive skewness (Peat & Barton, 2008). On the contrary, if the values estimated appeared to be higher than the actual maximum and minimum, the distribution was skewed to the left, signifying negative skewness (Peat & Barton, 2008). Therefore, a positive skewness indicates a value tailed to the right, with the negative to the left. This is judged based on the rule of thumb that considers any deviation larger than one half of the original mean to be abnormally distributed (Peat & Barton, 2008). In the event our data are not normally distributed, our logical conclusion might be the use of the non-parametric method to analyse our data. However, literature has shown that the assumption of normality becomes inessential with larger sample size, as its violation might not be fatal due to the central limit theorem (Pek et al., 2018).

## 6.16.5. Homoscedasticity of residuals

Residuals mean the variances that exist between the predicted and observed values (Tabachnick & Fidel, 2015). The presence of normally distributed residuals near the predicted line was an indication of normality. Examining the residuals was done by

checking the scatterplots of the variables (outcomes), and a rectangular distribution of the residuals against the values predicted indicates the assumption of homoscedasticity of residuals (Tabachnick & Fidel, 2015). In the event of homoscedastic distributional assumption violation, a Heteroscedastic Corrected Covariance Matrix (HCCM) will be adopted (Pek et al., 2018). HCCM has been used in the past to address misspecification (general) of which non-normality is inclusive (Dudgeon, 2017).

## 6.16.6. Missingness

Missingness refers to the absence of unaccounted data (Howell, 2007). We handled missing data by carefully planning the study and data collection. We limit data collection only to those participating in the study, minimising the number of follow-up to two (i.e., T1 and T2). Before the commencement of the study, we developed and documented a detailed operational manual specifying the methods of participant's screening, training of participants and research assistants, a communication channel between the investigators, research assistants, and participants, the procedure for implementing the interventions, data collection, and data entry.

We had prior training for all recruited personnel on all aspects of the ACD programme such as recruitment, intervention implementations, data collection and its entry into the SPSS before the subject's enrolment. We conducted a pilot feasibility study before the commencement of the main trial to identify the enablers and barriers to study implementation, and doing so may likely help reduce the amount of missing data. The research team set up a priori target for unacceptable missing data by putting up a monitoring and reporting mechanism at the data collection sites.

The researchers equally identify, and aggressively, but not coercively, engage subjects who are at risk of being lost at follow-up with the task of leading dance subgroups. However, if the subject decided to withdraw, the rationale for withdrawal was documented for subsequent use in analysis and outcomes interpretations. In the end, we carefully checked the original questionnaires for any missing entries. To identify the source of the missingness, performed missing value analysis to describe the pattern of missing data, their locations, and how extensive are they. Doing so will help us address concerns related to the incomplete data which might lead to misleading outcomes (Hedden et al., 2008).

Depending on its cause, missing data can be: 1) missing completely at random (MCAR), 2) missing at random (MAR), or 3) missing not at random (MNAR) (Kang, 2013). The probability of the occurrence of missing data can be MCAR when the missing data in observation does not depend on unobserved and observed data (i.e., there is no relationship between how the data is missing, and the observed data as well as those not available) (Kang, 2013; Carreras et al., 2021). In practice, a dataset with missing data <5% for each variable, might be considered MCAR. The MCAR mechanism is similar to MAR; however, not every MAR is MCAR (Zhu, 2014). Meanwhile, researchers can test the assumption of MCAR against its alternative hypothesis (MNAR) (Zhu, 2014). MNAR might be useful for sensitivity analysis of results that are not missing at random (Carpenter et al., 2006). MAR occurs when the missing data in an observation involved only the observed data (i.e., the missingness pattern has a relationship with the data observed, but not the missing data), and it might be due to an existing relationship between how the data is observed and missing, but we cannot see it for sure, while MNAR depends only on the

unobserved data, but has a relationship with both the observed and missing data (Kang, 2013; Carreras et al., 2021).

Depending on the nature of missingness (type of missing data), several statistical approaches were proposed in the literature (Zhu, 2014). These include 1) complete case analysis, 2) mean substitution, 3) last observation carried forward, and 4) multiple imputations (Zhu, 2014). We might select the one appropriate for our missing data.

In the Complete Case (CC) Analysis, all missing data will be deleted before the analysis, this is preferred with an adequate sample size, and the missing data was found to be small (Kim & Curry, 1977). If the MCAR assumption is satisfied, the mechanism might generate unbiased results (Kang, 2013). However, in the absence of a large sample, the power might not be satisfactory, and the assumption of MCAR is not met, this strategy might not be a data handling option. Therefore, researchers are advised to explore alternative options for data handling such as multiple imputations, maximum likelihood estimation, inverse probability weighting, or doubly robust inverse probability weighing (Carreras et al., 2021).

Mean Substitution (MS) is another method of handling missing data. Using this strategy the mean of the available observed values were imputed (Zhu, 2014). The previously collected data in an incomplete dataset might be utilised. This strategy was not accepted by many researchers as it has the possibility of increasing the sample size, thus leading to underestimates of error (Malhotra, 1987).

Last Observation Carried Forward (LOCF) is a method of replacing the missing values with the previously observed values from the same subjects (Hamer, & Simpson, 2009). This technique work based on the assumption that there will not be a change (time

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effect) after the last observed value (Zhu, 2014). It has been a popular approach as it is easy to understand and implement (Zhu, 2014). It is often used in longitudinal studies under MCAR with continuous outcomes (Zhu, 2014). However, in the presence of high dropout in the control groups, which could be due to lack of efficacy, there is the possibility of a biased treatment effect conclusion (Zhu, 2014). Therefore, this approach might lead to overestimation or underestimation of effects.

Multiple Imputation (MI) is a strategy for handling missing data under the assumption of missing at random (Kang, 2013). It is a blend of both the classical and Bayesian techniques commonly used in handling missing data in multivariate analysis (Zhu, 2014). It is the most widely accepted strategy in many fields (Sterne et al., 2009). MI operates by creating many versions of the data by replacing the missing values with more plausible ones (Carreras et al., 2021). Therefore, each of the complete datasets is then analysed using a standard statistical approach called "Rubin's combination rule" by pooling the results for final inference, it does so by obtaining a point estimate as well as the measure of precision to account for possible uncertainties which might occur due to missing information (Rubin & Rubin, 2009; Little & Rubin, 2020). It has a few assumptions such as 1) the mechanism of missing data should be MAR, 2) the model of analysis must match that of imputation, 3) the algorithm used for generating the imputed values must have the ability to include or accommodate associated/other relevant variables (Allison, 2002). However, recent evidence has shown that it can be modified to account for the MNAR as well (Moreno-Betancur, M., & Chavance, 2016). The MI strategy has the advantage of allowing the use of methods for complete data for analysis by incorporating errors (random) in the process of imputation (Zhu, 2014). Most importantly, it can

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accommodate any data/model without the need for specialised software (Zhu, 2014). However, it has three known disadvantages including 1) the need for more imputation efforts, 2) time for running the analysis, and 3) more computer storage for the created data sets (Zhu, 2014).

To determine whether the data were missing randomly or not, we conducted a preliminary missing value analysis (Little's MCAR test). Our null hypothesis for Little's MCAR test is that the data are missing completely at random (MCAR). If the p.value is >.05, we can accept the null hypothesis and conclude that the data are missing completely at random (Li, 2013). However, if the p.value is <.05, we reject the null hypothesis and conclude that the data are missing completely at random (Li, 2013). However, if the p.value is <.05, we reject the null hypothesis and conclude that the data are not missing completely at random, and there is some sort of systematic bias in the data (Li, 2013). The statistical handling of missing data was based on Jacobsen's algorithm three principles: 1) it is valid to ignore missing data if the missingness is less than 5% as it is negligible, 2) more than 40% missingness is substantial, and 3) assumption of missingness (i.e., MAR or MNAR) is unimportant due to the nature of our study design (Jacobsen et al., 2017) (Figure 15).



Figure 15. Jacobsen's algorithm

### 6.17. Intervention Fidelity Check

Assessment of the intervention fidelity was ensured based on two approaches including 1) methods for ensuring intervention fidelity, and 2) measures for ensuring the integrity of the interventions.

The methods for ensuring intervention fidelity includes a) dose as justified by attendance rates, the number of dance sessions delivered, and b) the quality of dance participation. For ensuring the integrity of the interventions, we write the protocol very clearly and communicate it to the ACD specialist, and monitor its implementations. We provide regular pieces of training and onsite monitoring/support while the intervention is ongoing. Any problem observed was amended. There was a total of eight sections in the ACD programme, with five subsections each week according to the protocol. For the attendance, the rates were recorded per subject and group in the ACD arm. To encourage attendance, the timing and frequency of visits were planned with the consent of the subjects, and the study population was reminded weekly via an appointed group leader who serves as a conduit of communication between us and the participants, as well as encouraging them to stay in the trial. Measuring intervention fidelity is very important because it improves the interpretability of research results, and their replication (Bova et al., 2017). The quality of participation was assessed using a three items observation checklist with a 5-point Likert scale. The scale assessed compliance to the protocol using the following parameters 1) the number of sessions delivered by the specialist, 2) how subjects followed the rhythm of dance and music, and 3) how they interact with one another (Appendix 21).

The monitoring method was entirely observational, and the person responsible for ACD dance fidelity monitoring was the dance specialist, with a minimum of 10 years of experience. We rated the fidelity outcome scores as 1= Poor, 2= Fair, 3= Average, 4= Good, and 5= Excellent. Better treatment outcomes were found to be effective in an intervention with a high level of fidelity (Durlak & DuPre, 2008). In contrast, poor fidelity might weaken outcomes (Burns et al., 2002). Therefore, in this study, we considered an average to excellent rating to be an acceptable fidelity level. In the event the fidelity outcome was poor, we will be cautious in interpreting the results, as it might be due to poor implementation of the interventions (McKenna et al., 2014).

#### 6.18. Methods for Reducing Intervention Contamination

We cluster people in the intervention group by selecting one campsite for intervention, and another campsite as a control. Only those residing in the Muna Garage camp were assigned to the intervention group while those in the Teachers Village camp were allocated to the control. The two camps were located at least 21.4 kilometres apart, and people don't meet one another. Therefore, the chances for contamination is very low. Further, organising an ACD programme might be costly for the displaced population due to the cost of hiring a band of musicians (at least two drummers, and one flautist). We only assigned interventionists and a band of musicians to the Muna Garage camp to implement the intervention regularly. On the contrary, in the control group, there were no dance specialists nor musical groups. Evidence in the literature has shown that for dance to be therapeutic, it has to be administered by a specialist or therapist (Strassel et al., 2011). An ACD specialist is someone with a piece of specialised knowledge and experience in leading African Circle Dance and is required for the effective conduct of an ACD programme. Even if the subjects have access to the ACD without a lead expert, it might not be effective. Therefore, the chances of contamination are very low.

## 6.19. Ethical Considerations

Ethical approval was obtained from the research and ethics committee of the Hong Kong Polytechnic University (HSEARS20190802005), State Emergency Management Agency (SEMA) (BO/SEMA/56/VOL.II/33), and Borno State Ministry of Health (BOMoH) (MOH/GEN/6679/1).

We sought the Hong Kong Polytechnic University's approval to ensure that our study protocol has met the highest required ethical standards for research with human subjects to safeguard their emotional, physical, and intellectual well-being. Similarly, we sought the permission of the SEMA, because the two camps were under their management. All health research related to IDPs should gain their approval before a study.

We followed the "Nursing research ethics, guidance and application in practice" recommendations to discuss ethical issues (Doody & Noonan, 2016).

### 6.19.1. Autonomy

Autonomy refers to a state in which subjects act as independent entities with the ability to make their own decisions and choices and to manage their concerns (Doody & Noonan, 2016). Based on the self-determination principle, subjects were allowed to decide whether to join the study, without coercion (Newell & Burnard, 2010). We ensured that participation in the ACD programme was voluntary, and subjects had the right to withdraw at any time without prejudicial treatment or penalty (Polit & Beck, 2006b). To ensure valid consent, subjects were informed of the potential benefits and risks of the ACD programme.

They were informed of the research conditions, the programme goals, data collection procedure, ACD procedures, commitment time, project funding source, and the participant selection process. They were also informed of our responsibilities as researchers, and their right to seek clarification, refuse to give information and terminate their participation (Polit & Beck, 2006b).

We ensured autonomy by ensuring the absence of any antithetical practices. Contact information for the principal investigator was provided to participants for any inquiries (Polit & Beck, 2006b). Those who agreed to participate were required to sign an informed consent form.

## 6.19.2. Beneficence

Beneficence refers to a state of doing something good or beneficent to others (Butts & Rich, 2005). The concept of beneficence in research attempts to explain that researchers should consider the welfare of the participants/society as their goal in any trial or research study (Beauchamp, 2008). This requires researchers to take measures that might benefit the participants by promoting their welfare (Butts & Rich, 2005). To ensure this, we conducted a risk-benefit assessment of the ACD programme to society at large and individual subjects. We equally had the study protocol reviewed for an acceptable risk/benefits ratio by the institutional review board. The board determined the validity of our assumptions by evaluating the nature of the risk benefits and estimating their probability of occurrence. Most importantly, dance intervention has been justified by a systematic review of evidence and was found to be beneficial for adults with depression (Karkou et al., 2019).

# 6.19.3. Non-maleficence

Non-maleficence simply means the act of non-inflicting harm or not harming subjects to achieve beneficial research results, by safeguarding the subjects (Doody & Noonan, 2016). We ensured this by putting a monitoring mechanism on subjects and providing counselling support for those in distress during and after the ACD intervention, and subjects were allowed to withdraw at any time they wished to.

## 6.19.4. Justice

The principle of justice refers to an ethical responsibility for a fair distribution of research burdens and benefits (Polit & Beck, 2006b). In the spirit of fairness, we ensured justice by giving all subjects in both camps an equal chance at being included in the study (Polit & Beck, 2006b). We considered and respected their cultures, religions, and other forms of human diversity (Polit & Beck, 2006b). Prejudicial treatment of subjects could infringe on justice; we, therefore, controlled this by ensuring there was no prejudicial treatment of subjects who declined or withdrew their participation, and all initial agreements of tokens for transport fares and stipulated procedures were honoured (Polit & Beck, 2006b).

The principal investigator provides contact details, and participants could provide clarification at any time (Polit & Beck, 2006b). We also monitored the subjects' physical and emotional status and referred those in need of help to healthcare providers for assistance (Polit & Beck, 2006b). Following the University policy for data security, all data was kept under lock and key. Subjects were informed of the confidentiality of their information, and participation was strictly voluntary, with the right to withdraw and withhold their data (Polit & Beck, 2006b).

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## 6.19.5. Veracity

Veracity refers to the act of being truthful to the research participants (Levine et al., 2010). It is the foundation. It is the foundation of trust between the researchers and the subjects towards achieving a common goal (Heikkinen et al., 2007). This involved researchers' conformity to facts, telling the participants the truth about the programme, and its accuracy, without any form of deception (Doody & Noonan, 2016). We ensured there was no act of deception undertaken by the researchers in relation to - the research participants, who were told the truth about the ACD programme (Parahoo, 2014). We explained all aspects of the programme by supplying them with all necessary information (See the principle of autonomy above). To ensure that they understood all information provided, we avoided the use of jargon or any language that might not express the truth to the participating subjects (Kent, 2000). There was no deliberate withholding or omission of information.

### 6.19.6. Fidelity

In research ethics, fidelity means a situation where trust between the participants and researchers is given and obtained (Nieswiadomy & Bailey, 2018). We ensured fidelity by being open and honest with the research subjects. The probable risks and burdens associated with the ACD programme were explained, and fostering trusting relationships as a measure to safeguard their rights was undertaken (Parahoo, 2014). This was effective because the IDPs and government trust our research. IDPs are aware that they can withdraw from the ACD programme at any time without consequences. Most importantly, the identifying information related to the research was destroyed immediately after the final report submission (Polit & Beck, 2006b).

## 6.19.7. Confidentiality

Confidentiality is defined as the agreement by researchers to store, handle, and share data relevant to research participants by making sure that data were not improperly divulged (Polit & Beck, 2006b). To ensure compliance with the 1964 Helsinki Declaration, subjects were informed that their data would be treated with confidentiality by maintaining their anonymity (Polit & Beck, 2006b). We ensured that personal information was kept confidential and did not make it publicly available without their prior knowledge and permission. To uphold their confidentiality, we allocated a special code for their identity in data entry (Stannard, 2012). Consideration was given to data storage and access, and the assigned identification numbers were only known to the principal researcher. Data were stored under lock, and the electronically stored information was password protected. All electronic data will be kept for three years after the completion of data collection. Participants were informed of the duration and time frame in which their data will be stored and destroyed (i.e., after submission of the final report).

### 6.20. Quasi-Experimental Design

A quasi-experimental design refers to an experimental condition without a critical element of randomisation in intervention groups (Polit, 2004). Randomised Controlled Trial (RCT) is a gold standard process of randomisation where each subject had the opportunity to be selected as an intervention and control. Nonequivalent pretest-posttest parallel-group control designs were used. Like the actual experiment, this design has three features of variables (dependent and independent); pre-testing and post-testing and the intervention and control conditions (Glanville et al., 2017).

## 6.20.1. The rationale for recruiting a parallel-group

Internal validity of a study refers to the degree to which a likely cause-and-effect relationship between the interventions and outcomes was established, which could not be from extraneous or confounding sources (Flannelly et al., 2018). Recruiting a parallel group in research ensures that every subject randomly receives one, and only one, treatment (Schulz et al., 2010). This approach appears to be a unique approach for controlling unrelated factors seen in clinical trials (Portney & Watkins, 2000). It is a known fact that clinical trials have many confounding effects, notably, effects of history and maturation commonly seen in longitudinal studies whose pre-post intervals were long, testing effects in studies with repeated measurements, or any other changes in the research context (Goldsmith et al., 2018; Mamdani et al., 2005). Designing research with a parallel control arm ensures that all subjects had equivalent factors (external and internal) (Gosselin & Riwan, 2006). We adopted two-arm parallel groups, as this appears to be one of the best ways to assess the effects of ACD interventions, and it helps in avoiding the effects of contamination (Keogh-Brown et al., 2007). In this programme, the control group means a study arm receiving the same treatment as the intervention group, except for the ACD dance.

## 6.20.2. The rationale for repeat measurements

Repeat measurement was done to evaluate the effectiveness of the intervention across time points (Atkinson, 2001). The baseline assessment was done to obtain the necessary information in both the intervention and control arms. The pretest data were collected before the programme commencement to determine the baseline comparability of the two groups in terms of demographics and pre-intervention psychological state (Polit, 2004). Comparing baseline data between the two study arms led to identifying the potential confounding factors that might influence the intervention effects (Brussaard et al., 1997). The identified confounding factors would be controlled by statistical analysis while testing our hypothesis. Baseline assessment allows for comparing the features of those who dropped out of the study to the features of those who completed it, detecting homogeneity amongst them (Morris & DeShon, 2002). Repeated measurements were done after implementing the intervention to investigate its dynamic at different time points; it provides the basis for assessing the intervention's effects in terms of the relationship between doseresponse, among others (Kristensen & Hansen, 2004). Most importantly, repeated measurement allows for detecting time or group effects and their interactions statistically, thus eliminating the impact of individual characteristics (Howitt & Cramer, 2011). A posttest was done on the same measures after the intervention was completed at week eight to assess its effectiveness (Appendix 22). A follow-up assessment was done to determine the study outcomes' validity, ascertain the sustained effects of the intervention, evaluate whether the project milestone has been met or not, and review new research developments, among others (Salkind, 2010). Eight weeks was selected as the programme duration because of the unknown recruitment and acceptability issues, and literature evidence has shown that effective dance studies were reported to have a course range of 6-12 weeks (Salihu et al., 2021). However, we shortened the follow-up period of this study to four weeks post-intervention due to the identification of an index case of COVID-19 in the Southern part of Nigeria, and the possibility of its spread, fear of movement restrictions in the event of a national lockdown.

### 6.21. Assessment of Adverse Events

Adverse events refer to harmful events occurring in a given trial where causality assumption existed (Murff et al., 2003). We began observing the participants for adverse events at the start of the administration of the ACD interventions, and this continued throughout the trial. In general, we arranged a check-up interview where participants were asked about certain adverse events associated with dance, such as injuries or pain in the foot and ankle, knee, or hips. The principal investigator's contact information was provided to participants for unsolicited or spontaneous reporting of any adverse events.

# 6.22. Chapter Summary

This is the ACD programme implementation phase. It covered the participants' eligibility criteria, method of recruitment, recruitment settings, settings and location where the data were collected, intervention content (brief health education and ACD), grouping, delivery methods, units of delivery, deliverer, setting, exposure quantity and duration, time and activities to increase compliance, study objectives, hypothesis, outcomes, methods used to collect data, information on validated instruments, sample size, assignment method, blinding, unit of analysis, and statistical methods. Others were the description of the samples, feasibility assessment, acceptability assessment, hypothesis testing, intervention fidelity check, ethical considerations, the quasi-experimental design, rationales for its usage, including that of the parallel groups, and repeated measurements and assessment of adverse events. The next chapter will present the ACD programme results.
#### 6.23. Pilot Feasibility Study

Before the commencement of the ACD programme (main study), we conducted a feasibility study to test the acceptability, practicality and perceived usefulness of the ACD intervention to the participants. The effect of the designed protocol (procedure) was also assessed to see whether it is practical to recruit subjects, implements the interventions, and collect data in the two camps. This was done to evaluate the effectiveness of our strategies, identify uncertainties relevant to the methods and design, as well as assessing the potential strategies for effective ACD programme implementation.

## 6.24. Method

For the feasibility assessment, a variety of approach was used including quasiexperimental with nested qualitative interviews. The pilot phase was intended to assess the contextual factors (barriers and enablers) associated with ACD programme implementation, perceived usefulness of the intervention, its acceptability, and strategies/methods used for the conduct of research (its practicality) (Moore *et al.*, 2011). The feasibility markers were the rates of recruitment, retention and dropout rates, adverse events reported. The acceptability was assessed using the overall satisfaction rate. A designed checklist was used to assess the perceived usefulness of the parts of the interventions to the participants, their level of satisfaction with the programme, and the frequency of dance sessions after the specialist session (Appendix 20).

The designed ACD protocol was implemented in two IDP camps using a two-group design to evaluate its potential for recruitment, intervention implementation, and data collection. Two IDPs camps were assigned to the intervention (brief health education and ACD) and control (brief health education only) groups, respectively. The camp of Muna

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Garage was assigned to the intervention group, while the Teacher's village camp was assigned to the control. Subjects were recruited if 1) adults  $\geq$  18 years, residing in camps for internally displaced persons 2) scored  $\geq$  10 on the depressive subscale of the DASS-21, and 3) could perform brisk walking.

The subjects in the intervention group received three weeks of weekly ACD dance led by a specialist, with each session lasting 75 minutes. The intervention and control groups received a one-off brief health educational intervention on stress management for 60 minutes in week one. Since this was a pilot feasibility study, no sample size calculations are provided due to the pilot nature of this study; however, the sample size was set to about 10% of the main study. Extant literature suggests that a pilot study sample in the medical field should be 10% of the sample projected for the larger parent study (Treece and Treece 1982; Connelly, 2008).

A total of 20 subjects were conveniently recruited in Muna Garage (n=10) and Teacher's village (n=10) camps, after screening, sixteen were found eligible and assigned to the intervention (n=8) and control (n=8) groups respectively. The two locations were chosen because they are intended for the conduct of the main study. The participants in the Muna camp met with the ACD specialist, and they had the opportunity to familiarise themselves with the venue. All their concerns and questions related to the study were clarified and answered at this phase, and they were required to sign an informed consent form.

Qualitative data was collected using a 6-guided interview open-ended questions (Appendix 23). A Focus group interview was conducted with the participants in the Muna Garage camp at week 4 (i.e., end of the pilot feasibility phase). Four subjects participated

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in the focus group interview, and seven complete the post-intervention survey. This is to explore participants' feelings about the programme, its organisation, strengths, limitations, and recommendation for improvement. Similar to other interventional studies, pre-test and post-test data were collected using the Hausa versions of the DASS-21, ISI and the Brief COPE scales together with demographic information. This is to compare the effects of the interventions across the groups and evaluate the changes occurring. For easy identification of the subject's responses, a unique identification code was used for each subject. The intervention procedure was similar to that of the main study (Refer to Table 12) for the procedure and content of the ACD programme.

The qualitative responses were analysed using content analysis using open coding to identify key themes/categories. Version 20 SPSS software (IBM Corp, Armonk, NY, USA) was used for data analysis. The quantitative data were analysed using the independent samples t-test to compare the scores of the ACD group with those of the brief health education to verify sample homogeneity at baseline. Categorical variables were summarised using frequency and percentages. We used the Mann Whitney U test (nonparametric test) to assess the effects of ACD, relative to brief health education. This is because of the observed data deviations from normality, and we have two independent groups on continuous measures. Each dependent continuous variable (i.e., depressive symptoms, stress, anxiety, insomnia, emotion, dysfunctional, and problem-focused coping) were assessed independently. The independent categorical variable were the groups.

### 6.25. Results

The recruitment rate was 80% successful, and there was no dropout indicating that the retention rate was high, as all subjects complied with the treatment regime and completed the interventions and follow-up as scheduled. It was easy to implement the ACD programme, and there was no report of adverse events. Generally, they were satisfied with the programme and its organisation, it helps in keeping them relaxed, thus improving their moods. The subjects recommended increasing the number of sessions and time. The main challenge observed was that of crowd control, and late participants reporting time. The overall programme satisfaction level was 100%. The parts were reported to be useful with brief health education (n=5, 71.4%), sharing sessions (n=4, 57.1%), and helpfulness of dance for emotions (n=5, 71.4%).

As shown in Table 14, the two groups differed at baseline for anxiety symptoms stress, and problem-focused coping. Preliminary evidence from this data might be concluded that ACD on top of brief health education intervention was not statistically significantly higher than brief health education alone for insomnia (U=17.5, p=.130, z=-1.538), depressive symptoms (U=21.5, p=.279, z=-1.112), stress (U=29.5, p=.798, z=-.281), anxiety (U=18.0, p=161, z-1.482), problem-focused coping (U=25.5, p=.505, z=-.691), Emotion-focused coping (U=28.0, p=721, z=-.422), and Dysfunctional-focused coping (U=30.0, p=.878, z=-.212) after three weeks intervention. As shown in Table 15, the average rank for insomnia, depressive symptoms, stress, and anxiety, was higher in the intervention group signifying more reduction compared to the control. Further, the average rank for the dysfunctional, problem and emotion-focused coping was higher for the intervention group signifying increased levels of coping.

Parameter	Intervention group (n=8)	Control group (n=8)
Demographics		
Age n (%)		
18-29years	3(37.5%)	1(12.5%)
30-49years	5(62.5%)	7(87.5%)
50years above	0(0%)	0(0%)
*Gender n (%)		
Male	2(25.0%)	6(75.0%)
Female	6(75.0%)	2(25.0%)
Marital status n (%)		
Married	6(75.0%)	5(62.5%)
Not married	2(25.0%)	3(37.5%)
Educational status n (%)		
No formal education	6(75.0%)	4(50%)
Primary school	2(25.0%)	4(50%)
High school or above	0(0%)	0(0%)
Employment status n (%)		
Employed	0(0%)	1(12.5%)
Unemployed	8(100%)	6(75.0%)
Retired	0(0%)	1(12.5%)
DASS-21 Scale M±SD		
Depression	24.3±2.5	$28.8 \pm 6.8$
*Anxiety	$18.3\pm8.0$	$26.0 \pm 6.3$
*Stress	19.3±5.6	26.0±7.3
ISI Scale M±SD		
Insomnia	15.6±4.7	11.3±6.0
Brief COPE Scale M±SD		
Emotion	22.4±1.8	24.0±4.1
Dysfunction	27.1±3.4	$25.4 \pm 1.8$
*Problem	15.1±3.3	$18.5 \pm 3.1$

Table 14. Between-group differences at baseline for intervention and control groups

Note: \*p= significantly differs at baseline; Emotion= Emotion-focused coping; Dysfunction= Dysfunctional-focused coping; Problem= Problem-focused coping; M=Mean; SD=Standard Deviation.

Variables	Intervention (n=8)	Median	Control (n=8)	Median	p.value
<b>Depressive symptoms (Mean rank)</b>					
Pre	9.75	25.0	7.25	24.0	.328
Post	9.81	10.0	7.19	9.0	.297
Anxiety (Mean rank)					
Pre	10.88	24.0	6.13	16.0	.050
Post	10.25	16.0	6.75	10.0	.161
Stress (Mean rank)					
Pre	10.81	26.0	6.19	21.0	.050
Post	8.81	4.0	8.19	4.0	.798
Insomnia (Mean rank)					
Pre	7.25	13.0	9.75	15.0	.328
Post	10.31	15.0	6.69	5.5	.130
Emotion-focused coping (Mean ran	k)				
Pre	8.25	32.5	8.75	33.0	.878
Post	9.00	29.0	8.00	29.0	.721
Dysfunctional-focused coping (Mean	n rank)				
Pre	9.19	18.0	7.81	17.0	.574
Post	8.75	17.5	8.25	16.5	.878
Problem-focused coping (Mean ran	k)				
Pre	10.69	23.0	6.31	18.0	.065
Post	9.31	20.5	7.69	19.0	.505

Table 15. Mean Rank for the psychological variables and coping strategies

## 6.26. Discussion

We found the logistics for recruitment, intervention, and data collection for the ACD programme were smooth. The participants appreciated both interventions, and the intervention process was smooth in terms of organisation of talk, run-down, and evaluation using the survey form. The non-significant effects may likely be due to lack of adequate sample size, and the short duration of the intervention. Further, the single-item self-developed questionnaires for satisfaction, the usefulness of brief health education on mood, the usefulness of ACD on mood, and frequency of dance after the session were not validated; therefore, findings should be treated with caution. We decided to keep our intervention protocol for both groups. Then, we conducted a full-scale study as planned.

#### **Chapter 7. ACD Programme Results**

This chapter presents the sample characteristics, demographic and clinical profiles, group equivalence at baseline, identification of the covariate variables, and addressing confounders and hypotheses for testing.

## 7.1. Participant Flow

As shown in Figure 16, 280 subjects (n=280) were approached, 15 subjects were found ineligible, while 67 declined. One hundred and ninety-eight (198) were recruited in this study, with 98 in the control and 100 in the intervention group, respectively. We recruited 198 intending to manage withdrawals and the availability of subjects. The recruited subjects were allocated to the intervention and control groups based on their camp of residence. The participant flow: the recruitment rate was 70.7% (198/280). The overall retention rate was 86.4% (171/198). The attrition rate at T1 (i.e., immediately after completing the intervention) was 0%. However, the rate at T2 (i.e., study follow-up) was 13.6%. To be specific, the intervention group was 17.0% (17/100) and 10.2% (10/98) for the control group. Most importantly, in this study, missing data were only reported from lost subjects at follow-up (being arrested by the authorities n=2) and (change of camps of residence (n=25). All groups completed their sessions. However, some subjects missed their sessions, with 53.0% having more than an 80% attendance rate. For the intervention group, the average rate of attendance per group was 74.9, with 79.5% reported per subject. For the control group with the brief health educational component, all participants had 100% attendance. To reduce the attrition rate in the ACD programme, we organised the timing and frequency of visits, and there was a weekly reminder to the study population via an appointed group leader that serves as a medium of communication between us and the participants, she also encourages them to remain in the trial. Incorporation of a travel allowance in the form of cash coupons (HK\$80) to a population that is economically disadvantaged might equally play a role in reducing attrition.



Figure 16. The Participant Flow diagram

#### 7.2. Recruitment

The recruitment was done from 21<sup>st</sup> November 2019 to 5<sup>th</sup> December 2019, and follow-up was done from 9<sup>th</sup> to 15<sup>th</sup> March 2020. Study information was disseminated at different locations in the two camps inviting the IDPs to a dance programme screening. The staff of the respective camps' psychosocial unit referred eligible subjects to the research assistants for screening. All recruitments and screening were done in their

respective camps of residence. Although recruitment to the experimental condition is predetermined in this study, the uneven number of subjects in two groups may likely be due to accessibility problems of recruiting participants that met our eligibility criteria and are willing to participate.

#### 7.3. Baseline Data

### 7.3.1. Participant Demographic and Clinical Characteristics

As shown in Table 16, the majority of the participants are 18-29 years, with females n=102, 51.5%), unemployed (n=179, 90.4%), married (57.6%, n=114), and with no formal education (74.2%, n=147). The two study groups differed significantly at baseline in terms of depressive symptoms, insomnia and coping (emotion, problem, and dysfunctional-focused).

#### 7.4. Baseline Equivalence

We assessed the baseline group differences using the independent t-test for the continuous variables, while the Chi-square test was used in comparing categorical variables. As shown in Table 16, there was no significant difference at baseline in terms of age (p=.195), gender (p=.582), employment (p=.174), and anti-depressant use (p=.774). A significant difference was seen between marital status (p<.001) and education (p=.038). There were also clinical differences in depressive symptoms (p<.001), insomnia (p<.001). There was a significant difference in coping strategies: Problem-focused coping style (p=.002), dysfunctional-focused coping style (p<.001) and emotional-focused coping style. The actual age of the participants was not collected due to a lack of accurate records.

Participant characteristics	All (n=198)	Control (n=98)	Intervention (n=100)	p-value
Age, n (%)				.195
18-29 years	102 (51.5)	60 (61.2)	42 (42.0)	
30-49 years	80 (40.4)	32 (32.7)	48 (48.0)	
50 years above	16 (8.1)	6 (6.1)	10 (10.0)	
Gender, n (%)				.582
Male	71 (35.9)	37 (37.8)	34 (34.0)	
Female	127 (64.1)	61 (62.2)	66 (66.0)	
Education, n (%)				.038*
No formal education	147 (74.2)	65 (66.3)	82 (82.0)	
Primary education	19.0 (9.6)	13 (13.3)	6 (6.0)	
High school or above	32.0 (16.2)	20 (20.4)	12 (12.0)	
Marital status, n (%)				<.001**
Married	114 (57.6)	49 (50.0)	65 (65.0)	
Widowed	25 (12.6)	9 (9.2)	16 (16.0)	
Divorced	22 (11.1)	10 (10.2)	12 (12)	
Never married	37 (18.7)	30 (30.6)	7 (7.0)	
Employment, n (%)				.174
Employed	8 (4.0)	5 (5.1)	3 (3.0)	
Unemployed	184 (93.0)	88 (89.8)	96 (96.0)	
Retired	6 (3.0)	5 (5.1)	1 (1.0)	
Anti-depressant, n (%)				.774
Yes	19 (9.6)	10 (10.2)	9 (9.0)	
No	179 (90.4)	88 (89.8)	91 (91.0)	
Retired	6 (3.0)	5 (5.1)	1 (1.0)	
DASS-21, mean (SD)				
Depression	26.5 (4.1)	25.2 (3.6)	27.7 (4.2)	<.001**
Anxiety	23.4 (6.9)	23.2 (8.1)	23.6 (5.6)	.645
Stress	21.5 (6.5)	21.8 (6.8)	21.2 (6.1)	.532
Brief COPE Scale, mean (SI	<b>D</b> )			
Emotion	16.8 (3.1)	15.7(3.4)	17.8(2.3)	<.001**
Dysfunctional	24.5 (4.2)	25.4(5.9)	23.6(2.8)	<.001**
Problem	14.8 (3.4)	12.7 (2.7)	17.1 (2.4)	.002*
ISI Scale, mean (SD)	14.4(6.1)	17.1(6.3)	11.7(4.4)	<.001**

Table 16. Demographic and clinical characteristics

\*p<0.05, \*\*p<0.001; DASS-21 scale: Depression Anxiety Stress Scale-21; M: Mean; SD: Standard Deviation; SO: Significant Others; Emotion=Emotion-focused coping; Problem=Problem-focused coping; Dysfunctional=Dysfunctional-focused coping; ISI: Insomnia Severity Index.

#### 7.5. Numbers Analysed

The ACD analysis includes all participants who completed the interventions at T1. Twenty-seven subjects (intervention group: n=17, 17%; control group: n=10, 10.2%) were lost to follow-up. All (n=198, 100%) were included in the analysis. The missing data in our study was a unit-level non-response where no information was collected from the subjects

at follow-up. As shown in Figure 17, all seven variables had missing data. There were 171 (86.4%) complete cases, with 27 cases (13.6%) missing at least one data point (Table 16). The potential missing cases might be 1,386 (i.e., 7 variables x 198). However, according to this chart, there are 189 missing values (missing data points) in the entire sample which is equivalent to 4.5% (Figure 17). Figure 18 showed the missing pattern, and it occurs at T2 (Follow-up). According to Dong and Peng (2013), the proportion of missing data was a direct reflection of the quality of the statistical inferences. Considering the 4.5% missing values in this study, we run a "little's MCAR test" to evaluate whether the loss data were missing randomly or not. The results were: Chi square=26.559, Degree of Freedom=14, and level of significance=.022 which is statistically significant. This indicated that our data is not missing at random. It appears the missing values is the same for all variables, and small to change the outcomes (Figure 17). Although there is no universally agreed literary cutoff for an acceptable missing data proportion, a missing rate at  $\leq 5\%$  was regarded as inconsequential (Schafer, 1999). Bennet (2001) believes that statistical analysis may likely lead to a biased outcome when the missing data was  $\geq 10$ . Because the missing values were less than 5% in this study, we only used the observed data, and report it as a limitation (Jacobsen et al., 2017).



Figure 17. Overall Summary of the Missing Values



Figure 18. The Missing Value Patterns

Table 17. Variable summary

Variables	T0	<b>T1</b>	T2	All
Depression, N (%)	0 (0%)	0 (0%)	27 (13.6%)	27 (4.5%)
Anxiety, N (%)	0 (0%)	0 (0%)	27 (13.6%)	27 (4.5%)
Stress, N (%)	0 (0%)	0 (0%)	27 (13.6%)	27 (4.5%)
Coping-emotion, N (%)	0 (0%)	0 (0%)	27 (13.6%)	27 (4.5%)
Coping-dysfunctional, N (%)	0 (0%)	0 (0%)	27 (13.6%)	27 (4.5%)
Coping-problem, N (%)	0 (0%)	0 (0%)	27 (13.6%)	27 (4.5%)

T0=baseline, T1=post-intervention, T2=follow-up.

## 7.6. Outcomes and Estimation

# 7.6.1. Objective 1. Evaluating the effects of ACD on outcomes of depressive symptoms, stress, anxiety, insomnia, and coping.

## 7.6.1.1. Depressive Symptoms

As shown in Table 18 and Figure 19, the group effect on depressive symptoms was significant (p<.001), and so were the time effects (p<.001). In the posthoc pairwise analysis, the depressive symptoms in the intervention group showed a significant reduction at T1 (MD 18.0, p<0.001), and at T2 (MD 2.1, p=.011). The group and time interactive effects were also significant at T1 ( $\beta$ =-6.6, 95% CI: -8.73, -4.41; p<.001), and T2 ( $\beta$ =-3.4, 95% CI: -5.46, -1.39; p=.001). The reduction in depressive symptoms was more significant in the intervention group than in the control group, with a very strong magnitude of interaction effect size (Cramer's v=.33; p<.001). There were no differences in results interpretation for either the unadjusted or adjusted models (Appendix 24).



Figure 19. Graphical illustration of the comparison of changes in depressive symptoms over time points by group. T0=Baseline; T1=Post-intervention; T2=Follow-up

Outcomes	Time	Control (n=98) Mean (SE)	Intervention (n=100) Mean (SE)	G	Т	GxT interaction effets $\beta$ (95% CI)	p-value	Cramer's V
<sup>a</sup> Depressive s	symptoms -	Adjusted						
•	TO	24.8 (2.7)	26.1 (2.6)					
	T1	13.4 (2.7)*	8.1 (2.7)*			-6.6 (-8.73, -4.41)*	<.001	
	T2	12.3 (2.7)*	10.2 (2.8)*	<.001	<.001	-3.4 (-5.46, -1.39)*	.001	.33
<sup>a</sup> Anxiety - A	djusted							
	T0	21.3 (4.4)	21.5 (4.3)					
	T1	12.1 (4.5)*	13.6 (4.3)*			1.4 (-1.53, 4.26)*	.355	
	T2	10.5 (4.5)*	12.7 (4.4)*	.067	<.001	2.0 (-0.69, 4.75)*	.143	.008
<sup>a</sup> Stress – Adj	usted							
	T0	21.4 (3.6)	20.5 (3.7)					
	T1	5.2 (3.6)*	2.6 (3.5)*			-1.9 (-3.94, 0.11)*	.008	
	T2	9.3 (3.6)*	5.3 (3.6)*	<.001	<.001	-3.3 (-5.45, -1.14)*	.003	.15
<sup>b</sup> Insomnia-A	djusted							
	T0	16.0 (4.5)	12.3 (4.8)					
	T1	9.6 (4.6)*	10.7 (4.6)*			4.8 (2.33, 7.20)	<.001	
	T2	6.8 (4.6)*	8.9 (4.6)*	.799	<.001	5.7 (3.80, 7.68)	<.001	.29
<sup>c</sup> Emotion-foc	cused Copin	g-Adjusted						
	T0	26.2 (2.2)	28.8 (2.0)					
	T1	23.9 (2.1)	29.1 (2.0)*			2.5 (0.87, 4.19)*	.003	
	T2	23.6 (2.2)	31.8 (2.0)*	<.001	.011	5.5 (3.83, 7.21)*	<.001	.32
<sup>d</sup> Dysfunction	al-focused (	Coping-Adjusted						
	T0	24.7 (3.1)	23.6 (3.2)					
	T1	23.0 (3.3)	25.5 (3.2)*			3.6 (2.16, 5.09)*	<.001	
	T2	22.6 (3.2)	25.4 (3.2)*	<.001	.805	3.9 (2.35, 5.47)*	<.001	.28
<sup>e</sup> Problem-foc	cused Copin	g-Adjusted						
	T0	16.2 (2.2)	17.6 (2.1)					
	T1	14.1 (2.2)	16.2 (2.1)			0.8 (-0.30, 1.83)	.161	
	T2	13.2 (2.2)	17.0 (2.2)	<.001	<.001	2.3 (1.15, 3.54)	<.001	.20

Table 18. Effects of the ACD interventions on depression, anxiety, stress, and coping strategies

\*Significant; M: Mean; SE: Standard Error; β (Beta coefficient); G: Group; T: Time; GxT: Group\*Time; CI: Confidence Interval.

a=baseline depressive symptoms, age, gender, employment, age, marital status, and levels of education.

b=baseline depressive symptoms, baseline insomnia, age, gender, employment, age, marital status, and levels of education
c=baseline depressive symptoms, baseline emotional-focused coping, age, gender, employment, age, marital status, and levels of education
d=baseline depressive symptoms, baseline dysfunctional-focused coping, age, gender, employment, age, marital status, and levels of education
e=baseline depressive symptoms, baseline problem-focused coping, age, gender, employment, age, marital status, and levels of education

# 7.6.1.2. Anxiety

As shown in Table 18 and Figure 20, the group effect on anxiety was not significant (p=.067); however, the time effect is significant (p<.001). In the posthoc pairwise analysis, the anxiety in the intervention group showed a significant reduction at T1 (MD: 7.9, p<.001) but not at T2 (MD: 0.9, p=.244). The group and time interactive effects was also not significant at T1 ( $\beta$ =1.4, 95% CI: -1.53, 4.26; p=.355), or T2 ( $\beta$ =2.0, 95% CI: -0.69, 4.75; p=.153). There seems to be a reduction in anxiety for both groups; however, the magnitude of the interactive effects was very weak (Cramer's v=.008; p=.335). There were no differences in results interpretation for either the unadjusted or adjusted models (Appendix 24).



Figure 20. Graphical illustration of the comparison of changes in anxiety over time points

by groups. T0= Baseline; T1=Post-intervention; T2=Follow-up

## 7.6.1.3. Stress

For stress, as shown in Table 18 and Figure 21, the group effect on stress was significant (p<.001), and so was the time effect (p<.001). In the posthoc pairwise analysis, the stress in the intervention group showed a significant reduction at T1 (MD: 17.9, p<.001), and T2 (MD: 2.7, p<.001). The group and time interactive effects were not significant at T1 ( $\beta$ =-1.9, 95% CI: -3.94, 0.11; p=.008), but significant at T2 ( $\beta$ =-3.3, 95% CI: -5.45, -1.14; p.003). Stress reduction was more pronounced in the intervention group than in the control group, and the magnitude of the interactive effect was strong (v=.15, p=.008). There were no differences in results interpretation in either the unadjusted or adjusted models (Appendix 24).



Figure 21. Graphical illustration of the comparison of changes in Stress over time points

by groups. T0= Baseline; T1=Post-intervention; T2=Follow-up

## 7.6.1.4. Insomnia

In terms of insomnia, as shown in Table 18 in the adjusted model and Figure 22, the group effect was not significant (p=.799); however, the time effect is significant (p<.00). In the posthoc analysis, insomnia in the intervention group showed a significant reduction at T1 (MD: 1.6; p<.001) and T2 (MD: 1.8; p<.001). The group and time interactive effect was significant at T1 ( $\beta$ =4.8, 95% CI: 2.33, 7.20; p<.001) and T2 ( $\beta$ =5.7, 95% CI: 3.80, 7.68; p<.001). The reduction was more in the control group than in the intervention group, with a very strong interactive effect (v=.29, p<.001). There were no differences in results interpretation for either the unadjusted or adjusted models (Appendix 24).



Figure 22. Graphical illustration of the comparison of changes in Insomnia over time points

by groups. T0= Baseline; T1=Post-intervention; T2=Follow-up

## 7.6.1.5. Coping: Emotion-focused

In terms of coping (emotion-focused subscale), as shown in Table 18 and Figure 23, the group effect was significant (p<.001), and so was the time effect (p=.011). In the posthoc analysis, the coping (emotion-focused) in the intervention group showed a significant improvement at T2 (MD: 2.7; p<.001) but not at T1 (MD: 0.3; p=.520). The group and time interactive effect was significant at T1 ( $\beta$ =2.5, 95% CI: 0.87, 4.19; p=.003), and T2 ( $\beta$ =5.5, 95% CI: 3.83, 7.21; p<.001). The intervention group increased significantly in coping (emotion-focused), with a corresponding reduction in the control group with a very strong interactive effect (Cramer's v=.32, p<.001). There were no differences in results interpretation for either the unadjusted or adjusted models (Appendix 24).



Figure 23. Graphical illustration of the comparison of changes in Coping (Emotionfocused) over time points by groups. T0= Baseline; T1=Post-intervention; T2=Follow-up

## 7.6.1.6. Coping: Problem-focused

In terms of coping (problem-focused subscale), as shown in Table 18 and Figure 24, the group effect on coping (problem-focused) was not significant (p=.799); however, the time effect was significant (p<.001). In the posthoc pairwise analysis, the coping (problem-focused) for the intervention group significantly reduced at T1 (MD: 1.4, p<.001) and T2 (MD: 0.8, p=.034). The group and time interactive effect was significant at T2 ( $\beta$ =2.3, 95% CI: 1.15, 3.54; p<.001), but not at T1 ( $\beta$ =0.8, 95% CI: -0.30, 1.83; p=.161). Most importantly, both study groups reduced at T1 and T2 with a strong interactive effect (v=.20, p<.001). There were no differences in results interpretation for either the unadjusted or adjusted models (Appendix 24).



Figure 24. Graphical illustration of the comparison of changes in Coping (Problemfocused) over time points by groups. T0= Baseline; T1=Post-intervention; T2=Follow-up

## 7.6.1.7. Coping: Dysfunctional-focused

As shown in Table 18 and Figure 25, the group effect on coping (dysfunctionalfocused subscale) was significant (p<.001); however, the time effect was not significant (p=.805). In the posthoc pairwise analysis, the intervention group showed a significant improvement at T1 (MD: 1.9, p<.001) but not at T2 (MD: 0.1, p=.741). The group and time interactive effect was significant at T1 ( $\beta$ =3.6, 95% CI: 2.16, 5.09; p<.001), and T2 ( $\beta$ =3.9, 95% CI: 2.35, 5.47; p<.001). The increase was seen in the intervention group, with a corresponding reduction in the control, and the magnitude of interactive effects was very strong (Cramer's v=.28, p<.001). There were no differences in results interpretation for either the unadjusted or adjusted models (Appendix 24).



Figure 25. Graphical illustration of the comparison of changes in Coping (Dysfunctionalfocused) over time points by groups. T0=Baseline; T1=Post-intervention; T2=Follow-up

## 7.6.2. Ancillary Analysis

#### 7.6.2.1. Load/Experiment Duration

Table 19 shows the total dance load of the ACD programme, which is 600 minutes.

Table 19. Dance load/experiment duration

ACD duration in weeks	Minutes/session	Rate of exposure	Dance load (total time in
			minutes)
8	75 minutes	Once weekly	600 minutes

#### 7.6.2.2. Intervention fidelity monitoring

All the eight dance subgroups completed their eight dance sessions; however, not all participants attended all the sessions. On average, the attendance rate per subject was 79.5% with groups having 74.9%. The participants were found to have followed the musical rhythm well, and there was positive interaction amongst the subjects.

#### 7.6.2.3. Regression to the mean

Due to the baseline group differences in depressive symptoms, we ran an additional analysis by separating the subjects into sub-groups according to their baseline depression level (DASS-depression cutoff at 13/14, as defined by the DASS). As shown in Table 20 below, there are no differences between subjects with high and low depression levels at baseline. Therefore, the evidence does not support the possible prominent regression-to-mean effect.

# 7.6.2.4. Sub-group analysis of those who took anti-depressants

About 9.6% of the study population was on anti-depressants. Therefore, we ran a sub-analysis using a non-parametric test (Kruskal Wallis) because of the samples' small size (n=19). At baseline, the median was 13.0, with an Inter-Quantile Range (IQR) of 2.0, while the median at post-intervention was 6.0 with an IQR of 7.0, and the test statistics (Z= -3.286, p<.001) were significant.

Outcomes	Time	Control (n=98) Mean (SE)	Intervention (n=100) Mean (SE)	G	Т	GxT interaction effets $\beta$ (95% CI)	p-value
Low depressive	symptoms						
Depressive symp	ptoms - Adjusted						
	T0						
	T1	9.0 (2.5)	7.3 (2.4)				
	T2	7.4 (2.4)*	9.9 (2.5)	.339	.233	4.2 (2.71, 5.78)	< 0.001
High depressive	symptoms						
Depressive symp	ptoms - Adjusted						
	T0	25.8 (3.3)	26.6 (3.2)			NA	
	T1	19.4 (3.6)*	23.6 (4.0)*			3.4 (-1.27, 8.08)	
	T2	20.7 (3.6)*	14.8 (3.3)*	0.734	<.001	-6.7 (-8.96, -4.53)	<.001

Table 20. Sub-analysis with low and high depressive symptoms at baseline

\*Significant; M: Mean; SE: Standard Error;  $\beta$  (Beta coefficient); G: Group; T: Time; GxT: Group\*Time; CI: Confidence Interval; NA: Not Available.

## 7.7. Adverse Events

No adverse events, such as injury falls among others, were reported.

# 7.8. Chapter Summary

The chapter covers the results of the ACD programme including the participants flow, demographic features, numbers of subjects analysed, outcome and estimation, load/experiment duration, intervention fidelity monitoring, regression to the mean, subgroup analysis of those who took anti-depressants and adverse events recorded. The next chapter will discuss the findings.

#### **Chapter 8. Discussion**

This chapter discusses the findings of the ACD programme, looking at the outcomes interpretation, study limitations, challenges and conclusion.

## 8.1. Strengths

To the best of our understanding, this is the first study to develop a systematic ACD plus brief health education intervention programme and test its feasibility and acceptability in Africa. It was the first trial showing promising effects in adult IDPs on mental wellbeing. The ACD protocol was developed using evidence from a systematic review which was validated by an expert's panel using a Delphi technique. The programme was based on locally adjusted contents, and the dance session was led by a trained ACD specialist instead of a certified dance therapist.

## 8.2. Effects on Stress, Anxiety, and Depressive Symptoms

ACD combined with standard care (brief health education) is more effective in reducing stress and depressive symptoms. Brief health education alone is also effective with large effect size, and significance, and it may share the major portion of the intervention effects. It might be that ACD has more components on top of brief health education such as music, and physical activity. Our study concurs with existing review evidence that brief educational interventions are effective to reduce depressive symptoms, and psychological distress (Donker et al., 2009). Research has shown that dance interventions (African dance inclusive) are sufficient for stress reduction as assessed by salivary cortisol and perceived stress (West et al., 2004). Dance reduces depressive symptoms, stress, and anxiety concurrently (Pinniger et al., 2012). Dance interventions

might enhance emotional wellbeing (Quiroga Murcia et al., 2010). Literature evidence has demonstrated a strong correlation between stress, depressive symptoms, and anxiety (Hammen, 2005; Pinniger et al., 2019). Unmanaged stress could lead to anxiety, resulting in depressive symptoms; conversely, stress reduction is associated with a corresponding decline in depressive symptoms and vice-versa (Hammen, 2005). This study provides initial evidence supporting that ACD intervention may augment the effects of brief health education leading to a reduction in stress and depressive symptoms. Clinically, ACD can be adopted as an adjunct strategy to manage stress and depressive symptoms. State officials (e.g. Health and health-related ministry staff) and other bilateral agencies (e.g. United Nations agencies and non-governmental organisations) working to promote the wellbeing of displaced populations or people affected by other forms of disasters are recommended to integrate dancing specific to the culture of the affected people in psychosocial support strategies for reducing stress and depressive symptoms. It can as well be adopted clinically to help promote the wellbeing of individuals in need of psychosocial support. However, a more robust study design (factorial design or cross-over RCT) is needed to confirm whether ACD alone is effective or not.

According to the DMT model, parts of the ACD include music and body movements (i.e., dance); these components combined act as a diversionary tactic that can occupy an individual's mind with pleasant thoughts, thereby taking their mind away from negative thoughts (Ko et al., 2019). Additionally, music can adjust states of emotion by promoting body-mind interactions (Dieterich-Hartwell, 2017). Further, the DMT model posits that music might reduce stress and anxiety due to providing stimulus and response, which may distract individuals' attention from the source of stress and anxiety (Jeffrey & Cary, 1990; Lindsey & Buckwalter, 2009). The music component of the dance may manage emotional conditions through body-mind interactions using neurotransmitters' neurochemical effects (Kattenstroth et al., 2010). Music can evoke memories and induce calmness in a subject; it stimulates the thalamus, insula, cerebellum, anterior cingulate, and orbital frontal cortex (Chanda & Levitin, 2013). These brain areas are known to play a role in interoception (Dieterich-Hartwell, 2017). The echoing and mirroring elements can influence emotional states. The playfulness in dance might upgrade the central nervous system for better interactions with stress (Koch, 2017; Wiedenhofer et al., 2017).

As explained in the conceptual framework, ACD is an exercise, and dance exercise leads to a release of endorphins, which reduces pain and helps an individual relax (Everly & Lating, 2002). The group element may play a role in the dance effects; our study findings are consistent with other literature, which has shown that group dance in a circle has positive curative effects on subjects (Borges da Costa, 2012; Hamill et al., 2012; Karampoula & Panhofer, 2018; Salihu et al., 2021). The group therapeutic effects may advance exchange, instill hope in the subjects, universality, activate collective unconsciousness, mirror reaction, and correct recapitulation (Karampoula & Panhofer, 2018). Group dance in a circle was used as a medium for social and community integration, which helps reduce isolation (Karampoula & Panhofer, 2018). Membership in a group dance enables the participants to learn from one another, integrate socially, and enjoy group cohesiveness, promoting mental well-being (Karampoula & Panhofer, 2018; Salihu et al., 2021). Evidence has shown that forming a circle in dance allows for holding participants' anxieties and fears, as the lead dancer (i.e., specialist or therapist) assumes the containment function (Karampoula & Panhofer, 2018). Importantly, participants holding hands in a circle dance positively affect mental health symptoms, like touch and being touched by others in a holding, contained, and safe environment might strengthen a withdrawn person's stress coping skills (Borges da Costa, 2012; Borges da Costa & Cox, 2016; Karampoula & Panhofer, 2018). Holding hands in dance is known to be a stress, anxiety, and depressive symptom reliever (Koch et al., 2007; Sriramka et al., 2021). Another possible mechanism for stress reduction was that the ACD programme was conducted in a socially organised environment (Salihu et al., 2021).

Dancing provides subjects with the opportunity to express their emotions with increased self-efficacy and reduced states of negative emotions (Pinniger, Brown, et al., 2013). The musical component of the dance was found to affect the brain ventral tegmental area associated with the release of dopamine, which explains it as a pleasurable stimulus (Rios Romenets et al., 2015). Dance intervention stimulates the limbic system and causes emotional involvement that binds individuals to objective, subjective, and dynamic experiences (Solla et al., 2019). Therefore, combining dance and music may increase subjects' motivation, accessibility, and enjoyability, leading to improved mood (Rios Romenets et al., 2015).

Another essential maturational component of dance whose impact may play a role in individuals' mood regulation and the promotion of positive emotional states is the idea of *"interoception"* (Dieterich-Hartwell, 2017). According to the DMT model, interoception is a sensational physical mechanism of the whole body system, inclusive of the perception of their state of emotions and mood (Craig, 2003; Hindi, 2012). Evidence has shown that interoception is responsible for identity perception, formation, and emotion processing (Craig, 2003). The brain's right hemisphere has a connection with the central

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nervous system (i.e., autonomous), enabling it to play a role in interoception (Schore, 2001). The regulatory loops (i.e., hypothalamus, amygdala, and the insular cortex) play a role in processing information in the brain (Fogel, 2009). To be specific, the two limbic parts, i.e., the insular and the cingulate cortex, are implicated in emotional and physical sensation perception (Cozolino, 2014; Van der Kolk, 2006). However, to regulate, coordinate, or perceive sensations, certain exchanges occur (Dieterich-Hartwell, 2017). The amygdala tends to react in the presence of perceived danger by stimulating the sensation of fear (Craig, 2003). The perceived fear is then further regulated by the pre-frontal cortex (i.e., medial); this explains why physical and emotional arousal might be regulated (Cozolino, 2014; Van der Kolk, 2006). The frontal cortex appraises the sensory information as either positive, negative, or neutral (Fogel, 2009). Comparatively, in terms of response, the amygdala is quick compared to the prefrontal cortex, with a process that responds to stress beyond our control (Dieterich-Hartwell, 2017). Thus, the need for a bottom-up approach for managing our physical system (Van der Kolk, 2006).

The bodily (somatic) sensations play a role; notably, tapping musical rhythm with the foot was found to modulate the dysregulated brainstem, which responds by providing positive feedback in the amygdala (Gantt & Tinnin, 2009; Perry, 2006). Dance movement was responsible for producing 'endorphins', a chemical produced in the human body for pain relief and stress (Everly Jr et al., 2013). It also leads to the production of 'neurotrophic growth factors' in the hippocampus, and plays a role in neurogenesis (Blumenthal et al., 2007). Stress affects the function of the hippocampus and alters the production as well as the survival of new neurons (Schoenfeld & Gould, 2012). Neurogenesis in adults is strongly correlated with the function of the hippocampus, including the stress response (Schoenfeld & Gould, 2012). This mechanism provides an additional explanation for why dance interventions might reduce stress.

The probable mechanism for adjusting stress and emotions could be that the dance and music components may manage emotional conditions through body-mind interactions using neurotransmitters' neurochemical effects (Kattenstroth et al., 2010). Further, the embodiment theory postulates that an individual's psychological state is based on the state of the body and that the formation of a bodily system is required to perceive, recognise, and interpret emotions (García-Díaz, 2018; Niedenthal et al., 2009). Therefore, mind-body interactions might help influence how we process emotional information, as emotional states affect the visceral, motor, and somatic systems (García-Díaz, 2018). According to this model, movement interventions might control individuals' emotions (Niedenthal et al., 2009).

This programme demonstrates that brief health education independently helps reduce anxiety; likewise, ACD does not add additional effects. It could be due to variations in the camp of residence & associated security challenges with the camp of residence. Another possible reason could be that the anxiety in this group is different from anxiety disorders, as dance intervention was previously found to reduce anxiety in other populations (Baptista et al., 2012; Pinniger et al., 2012), which may not be the same in those who have suffered traumatic experiences. Contrary to anxiety disorder, stress secondary to trauma is correlated with special circuitry in the brain with decreased feedback in the cingulate cortex (anterior) (Shin & Liberzon, 2010). Therefore, ACD intervention mechanisms might not reduce anxiety in this cohort, a group that had a traumatic experience. Further studies are needed to clarify the benefits of dance

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interventions in individuals with anxiety who have had a traumatic experience. Future studies should investigate the intercessional effect of stress on depressive symptoms, and anxiety using dance intervention after consideration of the outcomes.

#### 8.3. Effects on Emotion-focused Coping

ACD plus standard care (brief health education) is more effective to promote coping (emotion-focused), but not brief health education alone. Education-based coping might not help IDPs due to their low literacy level, and literacy level might be associated with efficacy. The results of this study establish that ACD likely promotes an emotionfocused coping strategy, utilising a mechanism different from brief health education. When ACD was added to brief health education, a significant improvement was seen. There is no evidence of dance intervention comparing its effects on emotion-focused coping. However, literature has shown that exercise intervention enhances emotionfocused coping (Jong-Ho & Larry, 2014; Mehrabi et al., 2012; Nejati et al., 2015). The current findings concur with the previous evidence, which shows that exercise intervention promotes emotion-focused coping (Mahajan, 2010; Schell et al., 1994). Therefore, ACD might be adopted clinically for emotion-based coping. Future studies should test whether coping is mediated by ACD, and how dancing could lead to what types of emotion-focused coping. Policymakers might use it as evidence for planning health promotion activities to enhance emotion-focused coping.

Research has demonstrated that traumatic experience memories are stored away, out of the reach of language, in the form of images, motor, or sensory (Gantt & Tinnin, 2009; Perry, 2006). According to the DMT model, dance might be a channel of communication, with the ability to act as a tool for the imagination, with the capacity to unlock memories, which in turn accesses imagination and results in the restoration of wellbeing (Gray, 2015). Through dance, subjects can speak their subconscious mind, making it an effective tool for communication (Akandere & Demir, 2011). Dance enables individuals to express themselves, reconnect and accept their bodies, cope with fear and depressive symptoms, rebuild self-confidence, and strengthen their resources (Ho et al., 2016). This mechanism explains why dance intervention might be sufficient to promote emotion-focused coping. Dance with music was found to play a role in regulating hyperarousal (Van der Kolk, 2006). A cool movement in a back and forth fashion, coupled with effortless rhythmically adjusted movements in a synchronised pattern, might help the emotional state shift (Dieterich-Hartwell, 2017; Hindi, 2012).

#### 8.4. Effects on Dysfunctional-focused Coping

On top of standard care (brief health education), ACD enhances the increased reduction of dysfunctional-focused coping. Consistent with a previous study, exercise intervention led to an increased reduction in the use of dysfunctional-focused coping strategies (Dale et al., 2011). Although these behaviours were not measured in this study, common dysfunctional-focused coping behaviours include self-blame, denial, and avoidance, or detrimental behaviours, such as abusing drugs or alcohol (Simpson, 2016). Substance abuse, venting, emotional disengagement, denial, and gambling are commonly reported coping strategies among IDPs (Maigida & Hassan, 2020; Saxon et al., 2017). ACD could help lessen the use of dysfunctional-focused coping behaviours. ACD may be integrated into clinical practices to enhance the increased reduction of dysfunctional-focused coping. Policymakers might consider it a strategy for reducing the use of approaches detrimental to individuals' health among displaced and

general populations. Future studies should consider assessing these detrimental behaviours.

Dance is a social physical activity that might engage participants, thus helping prevent them from participating in detrimental activities (Morris et al., 2004; Welsh-Asante & Hanley, 2010). According to DMT, shifting attention away from negative thoughts might be an emotion-focused coping strategy (Hindi, 2012). The National Institute on Drug Abuse has submitted that physical activity interventions (dance inclusive) might help reduce substance abuse (Kwan et al., 2013; Volkow, 2010). Those who choose to exercise are more likely to make healthy decisions, and any unhealthy decision to initiate substance abuse might be countered by the members of the team (Volkow, 2010). Offering different kinds of appealing challenges in a natural environment may provide the individual with the necessary skills for success, and enable him/her to take risks to achieve their goals (Volkow, 2010).

#### 8.5. Effects on Problem-focused Coping

Neither the ACD nor standard care (brief health education) could promote problem-focused coping. Corroborating with a similar study whose samples had a history of abuse, exercise intervention (yoga) could not enhance problem-focused coping (Dale et al., 2011). On the contrary, exercise promotes problem-focused coping in subjects with no history of abuse (Jong-Ho & Larry, 2014; Timlin & Simpson, 2017). Therefore, exercise interventions might benefit an individual with no history of distress in terms of problem-focused coping. This study proved that the multiple dimensions of IDPs' problems require problem-centric interventions. Therefore, we recommend the problem-
centred approach be added to any future interventions promoting problem-focused coping for people in distress or the general population.

The possible reason why the ACD programme could not promote problem-focused coping in this study was that the IDPs' problems have multiple dimensions, which could be: 1) economic e.g., lack of finances; 2) social e.g., lack of continuous social events in the camps; 3) political e.g., uncertainty about their future; and 4) security e.g., fear of reprisal attacks by terrorists (Horn, 2009; Orendain & Djalante, 2021). These factors combined make this situation difficult for our intervention to solve.

## 8.6. Insomnia

ACD plus standard care (brief health education) was administered, but the control group did better. ACD likely diminished its effects. It could be due to variation in study design (non RCT) associated with difficulties in controlling some confounders e.g., camp location with associated exposure to potential threats. Contrary to our findings, dance intervention was previously found to concurrently reduce depressive symptoms and insomnia (Pinniger et al., 2019). Considering the evidence in the literature showing that physical activity interventions reduce insomnia (Al-Eisa et al., 2013; Passos et al., 2012), the variation in our study might be due to differences in study design (non-RCT), which made it difficult to control some of the confounders (e.g., camp location). Referring to Appendix 19, the ACD group was located in a relatively unsafe area (on the outskirts of the metropolis) with security challenges due to the lack of a fenced wall (porous borders) and fluid movement of people. Therefore, it is reasonable enough to have this kind of result. Evidence has shown that IDPs and their families occasionally live on the outskirts of a city, and in areas prone to hazards, with poor services (Cotroneo, 2017). The ongoing stressful

circumstances coupled with the perceived exposure to potential threats may be likely factors contributing to the ineffectiveness of ACD interventions (Bohnet et al., 2018). Other factors could be the difference in the baseline insomnia scores between groups, and socio-demographic differences in terms of education, marital status and depression symptoms may likely be the factors affecting sleep conditions between groups. We, therefore, recommend that future research employ cluster RCTs for valid group comparison; an additional passive control arm might be added to provide a clear understanding of the effects of the ACD programme and its parts (i.e., brief health education and ADC) on insomnia.

#### 8.7. Influence of culture-specific elements

Dance is a concentrated physical activity that distils both our cultural and historical values (Pušnik, 2010; Schupp, 2020). It has been used by people for self-expression, leisure, fun, pleasure, a job for earning money, or for ritual or traditional purposes among others (Pušnik, 2010). Dance is an essential tool for understanding humanity, its cultural affiliations, and the society in which it exists (Pušnik, 2010). Its values are embodied in the form of dance, and its movement patterns illuminate and forge identities (group or personal), and define gender; it also reflects their values be it religious, political, personal, social, aesthetic or spiritual environments (Pušnik, 2010; Schupp, 2020). These factors might be the reason why the attendance and participants' responses in the ACD programme was high. However, a culturally specific element in the ACD programme might not lead to its effects, but it influences the high fidelity and compliance recorded which proves that the culture-specific elements did the job. These could be because of the narrative form of the dance which tells a story relevant to their culture, its expressive qualities which

communicate emotions and ideas using certain movement patterns, group movement as well as different forms of choreographing used (Boakye-Ni, 2008; Salihu et al., 2021).

### 8.8. Study Limitations

This study has limitations due to its utilisation of a non-randomised design, because of the non-random allocation of subjects. We adopted this approach due to consideration of the possibility of subject contamination in the camp, and the fact that people might respond differently. Therefore, it was not possible to compare the groups in this study due to the lack of homogeneity. Unbalanced participant features at baseline and the unobserved confounding factors might affect our confidence in the ACD intervention effects, even though we adjusted for the known established/unbalanced confounding factors. This study compares two interventions without a passive control group, and a cluster RCT was not adopted because of the difficulties in designing it and the associated threats to internal validity, which might occur at the cluster level e.g., the possibility of biased allocation, and at cluster trial phase e.g., prospective inclusion of subjects leading to selection bias, and the need for a larger sample (Puffer et al., 2003; Puffer et al., 2005). The recruitment bias in cluster RCT would likely defeat the aim of randomisation, and the requirement for larger samples might make the trial complex and longer, at an increased cost (Torgerson, 2001). We, therefore, recommend having a three-arm RCT in future studies.

The absence of a single group of ACD might be due to ethical concerns as all participants had depressive symptoms, and required minimal effective intervention, and brief health education was standard care for the IDPs recommended by the United Nations High Commissioner for Refugees (2007), and will not be replaced. We, therefore, added ACD on top of brief health education. Therefore, ACD intervention is not proven to be effective, and we were not certain of its effects.

A certified dance therapist is required to administer the intervention (Strassel et al., 2011); however, due to limited registered dance therapists available in Africa, we employed a dance specialist who knows ACD well and leads ACD dances (Salihu et al., 2021). The outcomes have promising therapeutic effects and might provide a basis for using dance specialists in research. We, therefore, recommend the utilisation of dance specialists in the African continent when conducting future studies (Salihu et al., 2021). ACD protocol might be adopted, integrated for use in different cultural settings. There is a need for institutional pieces of training of healthcare professionals to administer ACD. Future studies should compare the effects of dance interventions delivered by a specialist, in comparison to a therapist. The cost-effectiveness and efficiency of the ACD delivered by a specialist and therapist should be compared.

The engagement of ACD or even brief health education was not measured. Engagement is correlated with positive intervention outcomes (Yeager & Benight, 2018). We took attendance only, and we are not sure whether the participants engaged in dance after we left the intervention venue. Therefore, we are not confident that the participants strictly adhere to the intervention. Future studies should consider using a valid and reliable model of engagement to assess adherence and efficacy.

The social effect might be possible, as more attention was given to the intervention group as they gathered together and interacted weekly, whereas the control group had no direct contact with one another or with the staff, apart from the brief health education sessions. To control this effect, we added another brief health educational session in the

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midway intervention. This might have impacted the intervention by making it difficult to identify what was driving the effects. Evidence has shown that social support is strongly correlated with improved mental health and wellbeing. Future studies should consider using an RCT design, with the addition of another control group having a regular social activity but no dance.

It is difficult to conclude that ACD intervention is effective, as dance is not music or exercise or a combination of both. Dance is an artistic expression (Arnold, 1995). Research has shown that music, which is about listening, and exercise, which has to do with burning energy, were effective psychosocial support strategies (Krause & Davidson, 2021; Skold et al., 2019). Our ACD intervention includes both the music and exercise components; however, it is still unclear what is driving the effects. Therefore, future studies should consider introducing music listening and exercise with a meaningless movement group for effective comparison.

The guided checklist for intervention fidelity monitoring was not validated. Therefore, findings should be treated with caution as the tools might not be accurate and valid in measuring the process variables. Qualitative interviews were not conducted due to possible emotional strain. Items were not validated due to some constraints associated with cost and time. The wide variations of age among the participants may likely affect dance performance and cause co-variant effects. Further, the lack of formal education does not affect the training level of the participants as the intervention is relevant to their culture; however, it does affect questionnaire completion. There is the possibility of participation bias because the travel allowances given to the participants may boost up the attendance and minimise dropouts. Similarly, organising the timing of intervention delivery and frequency of visits based on the participant's convenience may likely affect our conclusion on their acceptability as participation might be different with different timing. The weekly reminder to the study population via an appointed group may likely lead to reminder bias.

The sustainability & impact of ACD intervention cannot be confirmed because follow-up data was collected 4-weeks after the completion of the intervention. This is due to the emergence of COVID-19 in the southern part of Nigeria, and fear of the possible national lockdown. This should be investigated further in future studies.

### 8.9. Challenges

Conducting this kind of study in a war torn-area of the world is associated with increasing management and security challenges. We have encountered several challenges. First, the male partners of some of the women participating in our intervention raised concerns about their wives going to dance without their consent. Therefore, married women in Africa should seek their partner's consent before participating in this kind of study, due to cultural and religious reasons. Second, the intervention delivery timing was changed on three occasions, from morning to evening, due to movement restrictions in the city. Participants' low levels of education affected their completion of the designed checklist which eventually affected their monitoring level. Finally, intervention delivery dates were changed twice, due to bomb explosions in neighbouring communities.

#### **8.10.** Implications for Practice

Based on the outcomes of this study, we recommended that ACD should be added as an adjunct on top of brief health education to relieve IDPs depressive symptoms and

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stress, as well as promoting emotion and dysfunctional-focused coping strategies in the IDPs camps. However, for people with insomnia, ACD is not recommended to be added because it makes it worst.

#### 8.11. Implications for Research

In line with our hypothesis in the conceptual framework, the emotion and dysfunctional focused coping increases with a corresponding reduction of stress and depressive symptoms. However, the mechanism has to be proven in further studies. A more robust design is needed to confirm whether ACD alone is effective to promote mental health and wellbeing. Similarly, the mediation effect of ACD on coping with stress should be investigated further. Therefore, for effective identification of the drivers of the effects of ACD, a cluster RCT with three arms where a passive control arm is added is recommended.

## 8.12. Implications for Policy

Policymakers working with the health and other relevant agencies such as the United Nations, state officials, and other non-governmental organisations were recommended to integrate dancing as a psychosocial support strategy for promoting psychological wellbeing.

# 8.13. Conclusion

The ACD programme was designed, refined, and standardised to suit the cultural context of Africa. It used a culturally sensitive approach in Africa and was a useful psychosocial support programme for a displaced population. ACD exerts significant effects on stress, insomnia, and depressive symptoms, not anxiety, independently of brief health education. It promotes emotion- and dysfunctional-focused coping strategies better than the control group. On the contrary, neither brief health education nor ACD interventions could promote problem-focused coping strategies. ACD plus brief health education was administered, but the control group did better for insomnia. Further, the effects of ACD on anxiety is unknown. Future studies should clarify the effect of ACD using populations with and without traumatic experiences. Three-arm cluster RCT is recommended with the introduction of a passive control arm for a clear understanding of the effects of ACD on insomnia.

This study has added new research evidence on the effectiveness of ACD in improving depressive symptoms, stress, and enhancing promoting coping (emotion and dysfunctional-focused) in the African context. Policymakers may find it a useful health promotion tool when planning psychosocial support for displaced and general populations. It can be adopted by clinicians as a strategy for reducing psychological problems (depressive symptoms and stress). Both ACD and brief health education could not enhance problem-focused coping, proving that the dimension of IDPs' problems is significant, and can only be addressed using a problem-centred (i.e., problem-specific) approach. Therefore, policy makers might find it useful evidence while planning psychosocial support programmes for IDPs or the general population.

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### **Appendix 1. Prospero registration**



#### Appendix 2. Databases search



## Appendix 3. The TIDieR Checklist

**T DieR** 

Template for Intervention Description and Replication

#### The TIDieR (Template for Intervention Description and Replication) Checklist\*:

Information to include when describing an intervention and the location of the information

Item	Item	Where Id	cated **
number		Primary paper	Other <sup>†</sup> (details)
		(page or appendix	
		number)	
	RRIEF NAME		
1.	Provide the name or a phrase that describes the intervention.	1 <u>01</u>	
	WHY		
2.	Describe any rationale, theory, or goal of the elements essential to the intervention.		
	WHAT		
3.	Materials: Describe any physical or informational materials used in the intervention, including those		
	provided to participants or used in intervention delivery or in training of intervention providers.		
	Provide information on where the materials can be accessed (e.g. online appendix, URL).		
4.	Procedures: Describe each of the procedures, activities, and/or processes used in the intervention,	-	
	including any enabling or support activities.		
	WHO PROVIDED		
5.	For each category of intervention provider (e.g. psychologist, nursing assistant), describe their		<u></u>
	expertise, background and any specific training given.		
	HOW		
6.	Describe the modes of delivery (e.g. face-to-face or by some other mechanism, such as internet or		
	telephone) of the intervention and whether it was provided individually or in a group.		
	WHERE		
7.	Describe the type(s) of location(s) where the intervention occurred, including any necessary		
	infrastructure or relevant features.		

TIDieR checklist

-

	WHEN and HOW MUCH		
8.	Describe the number of times the intervention was delivered and over what period of time including	<u></u>	
	the number of sessions, their schedule, and their duration, intensity or dose.		
	TAILORING		
9.	If the intervention was planned to be personalised, titrated or adapted, then describe what, why,		
	when, and how.		
	MODIFICATIONS		
10.*	If the intervention was modified during the course of the study, describe the changes (what, why,		
	when, and how).		
	HOW WELL		
11.	Planned: If intervention adherence or fidelity was assessed, describe how and by whom, and if any		
	strategies were used to maintain or improve fidelity, describe them.		
12.*	Actual: If intervention adherence or fidelity was assessed, describe the extent to which the		
	intervention was delivered as planned.		

\*\* Authors - use N/A if an item is not applicable for the intervention being described. Reviewers - use '?' if information about the element is not reported/not sufficiently reported.

† If the information is not provided in the primary paper, give details of where this information is available. This may include locations such as a published protocol or other published papers (provide citation details) or a website (provide the URL).

+ If completing the TIDieR checklist for a protocol, these items are not relevant to the protocol and cannot be described until the study is complete.

\* We strongly recommend using this checklist in conjunction with the TIDieR guide (see BMJ 2014;348:g1687) which contains an explanation and elaboration for each item.

\* The focus of TIDIeR is on reporting details of the intervention elements (and where relevant, comparison elements) of a study. Other elements and methodological features of studies are covered by other reporting statements and checklists and have not been duplicated as part of the TIDIeR checklist. When a randomised trial is being reported, the TIDIeR checklist should be used in conjunction with the CONSORT statement (see <a href="http://www.consort-statement.org">www.consort-statement.org</a>) as an extension of tem 1 of the CONSORT 2010 Statement. When a clinical trial protocol is being reported, the TIDIeR checklist should be used in conjunction with the SPIRIT statement as an extension of tem 11 of the SPIRIT 2013 Statement (see <a href="http://www.spirit-statement.org">www.spirit-statement.org</a>). For alternate study designs, TIDIeR can be used in conjunction with the appropriate checklist for that study design (see <a href="http://www.spirit-statement.org">www.spirit-statement.org</a>). For alternate study designs, TIDIER can be used in conjunction with the appropriate checklist for that study design (see <a href="http://www.spirit-statement.org">www.spirit-statement.org</a>). For alternate study designs, TIDIER can be used in conjunction with the appropriate checklist for that study design (see <a href="http://www.spirit-statement.org">www.spirit-statement.org</a>). For alternate study design (see <a href="http://www.spirit-statement.org">www.spirit-statement.org</a>).

TIDieR checklist

### Appendix 4. Spreadsheet for data extraction

E 5 - C - Data Stratesh Templatz - Social DD - D - X								
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2 s/no Author/year A	Age	Sample size Gender (%) 162 participants/147 (90.7%) females, 15 (9.3%) males	Outcomes	Intervention Dance Movement Therapy: Rate of Exposure: Once weekly exposure; Duration of exposure: 12 weeks; Minutes per session: 90 minutes; Total Dance Load in minutes: 1, 080; Who administer the intervention Pance therapid	Outcome measures Brief Symptom Inventory and	Theories		
Lope-Rodriguez et al. 4 2 (2017) 1	18-45 years	95 participants/24 (25.3%); Females 71 (74.4%).	Perceived stress, depression & sleep quality	Biodana Dance, Rate of exposure: once per week. Daration of exposure: 4 weeks. Minates per session: 90 minutes; Total dance load: 360 minutes; Who administer the intervention. Trained facilitator registered with the endorsed by the International Bioconteric foundation.	Pittsburgh Sleep Quality Index; Perceived Stress Scale and Centre for Epidemiological Studies Depression Scale	NA		
5 3 Pinniper et al. (2012) 1	18-80 years	66 subjects/ 90,9% females, 9.1% males	Depression, psychological stress and anxiety.	Mindfuness meditation & Tango dance, Rate of exposure. Once weekly, Duration of exposure. 6 weeks; Minutes per session: 90 minutes: 540 minutes; Trained Tango helpers; Mindfullness delivered as proposed by Kabatt- Zinn (1990).	The DASS-21 Scale; Satisfaction with life scale Rosenberg Seff Esteen § and Mindfulness Attensis Awareness Scale	Atting         Charts         Totals         Tables           Image: State of the sta	Sparklines	
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## Appendix 5. Summary of excluded studies

S/no	Author/year	Title	Reason for exclusion
1	Aguiñaga et al., 2017	Feasibility of a Latin Dance Program for Older Latinos With Mild Cognitive Impairment	No baseline assessment of depression
2	Aguiñaga and Susan 2017	Latinos unique scenario, addressing cognitive impairment via dance	A thesis
3	Barene et al., 2014	Soccer and Zumba as health- promoting activities among female hospital employees: A 40-weeks cluster randomised intervention study	No baseline depression assessment
4	Bräuninger, 2012	The efficacy of dance movement therapy group on improvement of quality of life: A randomized controlled trial	No baseline depressive symptoms assessment
5	Castillo et al. 2019	Implementation and evaluation of a performance profile intervention with collegiate dancers: A randomized controlled trial	A thesis
6	Borges et al., 2012	The effect of ballroom dance on balance and functional autonomy among the isolated elderly	No baseline assessment of depressive symptoms
7	Borges et al. 2014	Postural balance and falls in elderly nursing home residents enrolled in a ballroom dancing program	No baseline assessment of depressive symptoms
8	Duncan et al., 2014	Are the effects of community- based dance on Parkinson disease severity, balance, and functional mobility reduced with time? A 2-year prospective pilot study	No baseline assessment of depressive symptoms
9	Hackney et al. 2010	Social partnered dance for people with serious and	A single group pre-test post- test design

		persistent mental illness: A pilot study	
10	Kalsatou et al., 2015	Effects of exercise training with traditional dancing on functional capacity and quality of life in patients with schizophrenia: A randomized controlled study	No baseline assessment of depressive symptoms
11	Kalsatou et al., 2014	Functional and psychosocial effects of either a traditional dancing or a formal exercising training program in patients with chronic heart failure: A comparative randomized controlled study	No baseline assessment of depressive symptoms
12	Kalyani et al., 2019	Impacts of dance on cognition, psychological symptoms, and quality of life in Parkinson's disease	A Quasi Experimental study
13	Kloos et al., 2013	Video game play (Dance Dance Revolution) as a potential exercise therapy in Huntington's disease: A controlled clinical trial	No baseline assessment of depressive symptoms
14	Koehne et al., 2016	Fostering social cognition through an imitation- and synchronization-based dance/movement intervention in adults with autism spectrum disorder: A controlled proof-of- concept study	Not an RCT
15	Kosmat et al., 2017	The efficacy of a dance intervention as cognitive training for the old-old	No baseline assessment of depressive symptoms
16	Krampe and Jean, 2012	Dance-based therapy to decrease fall risk in older persons	A thesis
17	Kropacova et al., 2019	Cognitive effects of dance- movement intervention in a mixed group of seniors are not dependent on hippocampal atrophy	No baseline assessment of depressive symptoms
18	Kunkel et al., 2017	A randomized controlled feasibility trial exploring	No baseline assessment of depressive symptoms

		partnered ballroom dancing for	
19	Lewis et al. 2016	Mood changes following social dance sessions in people with Parkinson's disease	Not an RCT
20	Martin et al., 2016	Overcoming disembodiment: The effect of movement therapy on negative symptoms in schizophrenia—A multicenter randomized controlled trial	No baseline assessment of depressive symptoms
21	Meekums et al., 2012	Dance movement therapy for obese women with emotional eating: A controlled pilot study	Pre-post intervention design, not an RCT
22	Merom et al., 2016	Cognitive benefits of social dancing and walking in old age: The dancing mind randomized controlled trial	No baseline assessment of depressive symptoms
23	O'Toole et al., 2015	Impact of a dance programme on health and well-being for community dwelling adults aged 50 years and over	No baseline assessment of depressive symptoms
24	Pylvänäinen et al., 2015	A dance movement therapy group for depressed adult patients in a psychiatric outpatient clinic: Effects of the treatment	A Quasi-Experimental Study
25	Richard et al., 2020	Effects of movement improvisation and aerobic dancing on motor creativity and divergent thinking	No baseline assessment of depressive symptoms
26	Vaverniece et al., 2012	Dance movement therapy for obese women with emotional eating: A controlled pilot study": Erratum	Pre-post intervention design, not an RCT
27	Vinesett et al., 2015	Therapeutic potential of a drum and dance ceremony based on the African Ngoma tradition	A feasibility study with no evidence of randomisation
28	Barnet-Lopez et al., 2016	Dance/Movement Therapy and emotional well-being for adults with Intellectual Disabilities	A multiple treatment Single group-design. Group assignation could not be completed randomly
29	Punkanen et al., 2014	Emotions in motion: Short-term group form Dance/Movement Therapy in the treatment of depression: A pilot study	No evidence of randomization

30	Barnet-López et	Developmental items of human	No baseline assessment of
	al., 2015	figure drawing:	depressive symptoms
		Dance/movement therapy for	
		adults with intellectual	
		disabilities	
31	Chuang et al.,	A 3-month intervention of	No baseline assessment of
	2015	Dance Dance Revolution	depressive symptoms
		improves interference control in	
		elderly females: A preliminary	
		investigation	
32	Cruz-Ferreira et	Creative dance improves	No baseline assessment of
	al., 2015	physical fitness and life	depressive symptoms
		satisfaction in older women	
33	Domene et al.,	The health-enhancing efficacy	No baseline assessment of
	2016	of Zumba <sup>®</sup>	depressive symptoms
		fitness: An 8-week randomised	
		controlled study	
34	Duncan et al.,	Randomized controlled trial of	No baseline assessment of
	2012	community-based dancing to	depressive symptoms
		modify disease progression in	
		Parkinson disease	
35	Fisher et al.,	Effects of improvisational	No baseline assessment of
	2020	dance movement therapy on	depressive symptoms
		balance and cognition in	
		Parkinson's disease	
36	Goldov et al.,	The effects of individualized	A thesis
	2013	brief medical dance/movement	
		therapy on body image in	
		women with breast cancer	
37	Hamill et al.,	Dancing down memory lane':	No baseline assessment of
	2012	Circle dancing as a	depressive symptoms
		psychotherapeutic intervention	
		in dementia—A pilot study	
38	Ho et al., 2015	A place and space to survive: A	An uncontrolled clinical trial
		dance/movement therapy	
		program for childhood sexual	
		abuse survivors	
39	Ho et al., 2018	Perceived stress moderates the	No assessment of depressive
		effects of a randomized trial of	symptoms
		dance movement therapy on	
		diurnal cortisol slopes in breast	
		cancer patients	
40	Kalsatou et al.,	Effects of exercise training with	No assessment of depressive
	2018	traditional dancing on	symptoms
		functional capacity and quality	
		of life in patients with	

		schizophrenia: A randomized controlled study	
41	Kalsatou et al., 2014	Functional and psychosocial effects of either a traditional dancing or a formal exercising training program in patients with chronic heart failure: A comparative randomized controlled study	No assessment of depressive symptoms
42	Krampe et al., 2013	Exploring the effects of dance- based therapy on balance and mobility in older adults	No assessment of depressive symptoms
43	Pisu et al., 2017	A dance intervention for cancer survivors and their partners (RHYTHM)	No assessment of depressive symptoms
44	Prewitt et al., 2017	Effects of Dance Classes on Cognition, Depression, and Self-Efficacy in Parkinson's Disease	Non randomize controlled study
45	Souza-Santos et al., 2018	Dance and equine-assisted therapy in autism spectrum disorder: Crossover randomized clinical trial	The study population were children
46	Wiedenhofer et al., 2017	Activefactorsindance/movementtherapy:Specifyinghealtheffectsofnon-goal-orientationinmovementin	Non randomize controlled study
47	Rokka et al., 2010	The impact of exercise intensity on mood state of participants in dance aerobics programs	Non randomize controlled study
48	Endrizzi et al., 2017	Dance movement psychotherapy for patients with fibromyalgia syndrome	Single group pre-test post-test group design
49	Muller-Pinget et al., 2018	Body as subject, body as object: How treatment of the obese patient can be improved by dance therapy	No assessment of depressive symptoms
50	Burzynska et al., 2017	White matter integrity declined over 6-months, but dance intervention improved integrity of the fornix of older adults	No assessment of depressive symptoms
51	Koch et al., 2015	Fixing the mirrors: A feasibility study of the effects of dance movement therapy on young	Nonrandomized study

		adults with autism spectrum disorder	
52	McKee et al., 2013	The effects of adapted tango on spatial cognition and disease severity in Parkinson's disease	Depression was assessed only at baseline, and no post- intervention assessment, there was no evidence of randomization
53	Koch et al., 2019	Embodied self in trauma and self-harm: A pilot study of effects of flamenco therapy on traumatized inpatients	Nonrandomized study
54	Bräuninger et al., 2006	Treatment modalities and self- expectancy of therapists: Modes, self-efficacy and imagination of clients in dance movement therapy	No appropriate data for meta- analysis, and was published in 2006
55	Koch et al., 2007	The joy dance: Specific effects of a single dance intervention on psychiatric patients with depression	Published in 2007, we included only papers published in 2010 above

# Appendix 6. Content Validity Index (CVI) Assessment Form of the Dance

## Intervention

Content Validity Scale of the Dance Component of the African Circle Dance Programme						
Ν	Items	Not	Mostly	Releva	Very	Comments/recomme
0		releva	releva	nt (3)	relevant (4)	ndations
		nt (1)	nt (2)			
1	Duration of					
	Time					
	(75 minutes)					
2	Method of					
	delivery					
	(face to face)					
3	African Circle					
	Dance					
	Specialist to					
	deliver the					
	dance					
	intervention					

4	The community centre of the			
	IDP camp as a			
	venue for the			
	intervention			
5	Content			
	relevancy			
6	Appropriatene			
	ss of the			
	Programme			

# Appendix 7. Content Validity Index (CVI) Assessment Form of the Brief Health

## **Education Intervention**

			Content Val	idity Scale of	f the Health	n Education Components of the
ACD	Programme			-		-
No	Items	Not	Mostly	Relevant	Very	Comments/recommendations
		relevant	relevant		relevant	
		(1)	(2)	(3)	(4)	
1	Duration of					
	Time					
	(60 minutes)					
2	Method of					
	delivery					
	(face to face)					
3	Mental health					
	Nurse to					
	deliver the					
	health					
	education					
	intervention					
4	The					
	community					
	centre of the					
	IDP camp as a					

	venue for the			
	intervention			
5	Content			
	relevancy			
6	Appropriatene			
	ss of the			
	Programme			

### Appendix 8. DASS-21 Hausa Scale

#### MA'AUNIN CIWON BAKIN CIKI, FARGABA DA DAMUWA (DEPRESSION ANXIETY STRESS SCALE)

#### SUNA:\_\_\_\_\_

#### KWANAN WATA:

Ana buƙatar da karanta kowane bayani sannan kuma ka kewaye lamba ɗaya tak daga cikin wanɗannan jerin amsoshin 0 ko 1 ko 2 ko 3 da suka dace da kai daidai fahimtarka cikin sati da ya wuce. Babu wata amsa da ta ke ba dai-dai ba. Kar a ɓata lokaci a kan tambaya ɗaya.

Ga ma'aunin amsoshin kamar haka

0= Sam bai shafe ni ba - Sam (SM)

1= Ya shafe ni kaɗan – Jefi-jefi (JJ)

2= Ya shafe ni sosai – Akai-akai (AA)

3= Ya mutaƙar shafe ni ƙwarai - Koda yaushe (KY)

		SM	JJ	AA	KY	BC	F	D
1	Nakan sha wuya wajen kwantar da hankali na	0	1	2	3			
2	Ina sane da bushewar bakina	0	1	2	3			
3	Ba na jin zan iya samun annushuwa (jindaɗi) ko kaɗan	0	1	2	3			
4	Nakan sami wahalar numfashi (kamar numfasawa da sauri ko yankewar numfashi ba tare da nayi wani aikin ƙarfi ba)	0	1	2	3			
5	Nakan sha wuya wajen fara aiwatar da wasu ayyuka	0	1	2	3			
6	Nakan yi azarɓaɓi (sauri-sauri) a wasu yanaye-yanaye	0	1	2	3			
7	Nakan yi karkarwa (misali, a hannaye na)	0	1	2	3			
8	Nakan ji ina yin garaje sosai	0	1	2	3			
9	Ina damuwa da wasu yanaye-yanaye da zasu iya bani tsoro kuma su jawo min raini	0	1	2	3			
10	Nakan ji bani da wata mafita	0	1	2	3			
11	Nakan sami kaina cikin firgici	0	1	2	3			
12	Nakan kasa natsuwa	0	1	2	3			
13	Nakan samu damuwa da karayar zuciya	0	1	2	3	1		
14	Ina da rashin juriya kan duk wani abu da zai hana ni cigaba da abin da nake yi	0	1	2	3			
15	Nakan ji kamar zan gigita	0	1	2	3			
16	Ba na samun sha'awar komai	0	1	2	3			
17	Nakan ji bani da daraja, a matsayina na	0	1	2	3			

18	mutum Nakan ji ina cikin harzuka (hasala)	0	1	2	3		
19	Ina jin bugun zuciyata ko da kuwa babu wani aikin ƙarfi da nayi (kamar yanayin ƙaruwar bugun zuciya da tsayawar bugun zuciya)	0	1	2	3		
20	Nakan tsorata ba tare da wani dalili ba	0	1	2	3		
21	Nakan ji rayuwa bata da amfani	0	1	2	3		
				JIM	IILLA		

Translated with permission, from the original English version developed by Lovibond and Lovibond (1995) Lovibond SH, Lovibond PF. Manual for the Depression Anxiety Stress Scale. Sydney. 2<sup>nd</sup> Ed. The Psychological Foundation of Australia,1995.

### Appendix 9. The ISI Hausa Scale

#### MA'AUNIN TSANANCIN RASHIN BARCI (INSOMNIA SEVERITY INDEX)

Akwai tambayoyi guda bakwai na ma'aunin tsanancin rashin barci. An haɗa amsoshi guda bakwai domin a sami adadin makin. Ka kalli jagorar sanya maki da ke ƙasa don ganin inda matsalar baccinka ta yi daidai da ita.

Ga kowace tambaya, ana buƙatar ka kewaye amsar da ta yi daidai da kai.

Ana buƙatar ka auna abu na yanzu (kamar, sati biyu baya) game da TSANANIN matsalar rashin barcinka)

	Matsalar rashin barci	Babu	Kaɗan ne	Matsakaici ne	Maitsanani ne	Mafi tsananin gaske
1	Wahalar fara barci	0	1	2	3	4
2	Wahalar kasancewa cikin barci	0	1	2	3	4
3	Matsalar farkawa da wuri	0	1	2	3	4

4.	Ta yaya GAMSUW	A KO RASHIN GAMS	SUWA da yanayin barc	in ka yake a YANZU?					
	Na gamsu sosai	Na gamsu	Matsakaiciyar	Ban gamsuba	Ban gamsu ba				
			gamsuwa		ƙwarai				
	0	1	2	3	4				
5.	5. A ganin ka ta yaya mutane suke kallon rashin ingancin rayurka game da matsalar rashin barcin ka?								
	Sam babu	Dan kaɗan ne	Kadan ne	Da yawa	Da yawa sosai				
	0	1	2	3	4				
6.	Yaya yawan DAMU	WAR KO BACINRAN	N ka yake game da mat	salar barcin ka a yanzu	1?				
	Sam babu	Dan kaɗan ne	Kadan ne	Da yawa	Da yawa sosai				
	0	1	2	3	4				
7.	Ya kake ganin TASI	RIN matsalar barcin ka	a game da ayyukan ka i	na yau da kullum (kam	ar su gajiya da rana				
	da yanayi da iya aiwa	atar da ayyuka na kullu	ım da natsuwa da tunaı	ni da mayar da hankali	da sauransu) a				
	YANZU?								
	Sam babu	Dan kaɗan ne	Kadan ne	Da yawa	Da yawa sosai				
	0	1	2	3	4				

Translated with permission, from the original English version developed by Bastienet al (2001) Bastien CH, Vallières A, Morin CM. Validation of the insomnia severity index as an outcome measure for insomnia research. Sleep Med 2001;2(4):297–307.

## Appendix 10. Brief COPE scale Hausa

#### TAKAITACCEN MA'AUNIN JURIYA

#### (BRIEF COPE SCALE)

Lamba	Ababuwa	Bana yin wannan sam (1)	Ina yin wannan amma kaɗan (2)	Ina yin wannan amma matsaikaici (3)	Ina yin wannan sosai (4)
1.	Ina yin aiki ko sauran harkoki don kawar da abubuwa daga zuciyata				
2.	Ina mayar da hankali kan ƙoƙarina wajen yin wani abu game da yanayin da nake ciki				
3.	Nakan fada wa kaina cewa "wannan ba gaske ba ne"				
4.	Nakan sha giya ko wasu ƙwayoyi daban domin na ji daɗin jiki na				
5.	Nakan sami tallafin ƙarfafa zuciya daga wasu				
6.	Nakan karaya wajen ganin na magance ta				
7.	Nakan ɗauki mataki don ganin na samu kyautatuwar yanayin da nake ciki				
8.	Ina ƙin amincewa zuciyata cewa hakan ya faru				
9.	Nakan yi maganganu daban- daban don ganin na kawar da mummunan yanayin da nake ji a jikina				
10.	Ina samun taimako da kuma shawarwari daga wasu mutane				
11	Ina shan giya ko wasu ƙwayoyi don su taimaka min na natsu				
12	Ina ƙoƙarin kallon abu ta fuskoki daban-daban, don ganin ya zama mai amfani gare ni				
13	Ina zargin kaina				
14	Ina yin ƙoƙari wajen samo wasu dabaru game da abin da ya				

1	kamata na yi		
15	Ina samun kulawa da kyakkyawar fahimta daga wasu		
16	Ina karaya game da ƙoƙarina na jurewa		
17	Ina ƙoƙarin lalubo wani abu mai kyau daga abin da ke faruwa		
18	Nakan mayar da abin kamar wasa		
19	Ina aikata wasu ababuwa kamar zuwa gidan kallo ko karatu ko tunanin wani abu mai kyau ko yin barci ko zuwa sayayya domin su rage min tunanin abin		
20	Ina yarda da zahirin abin da nake gani, abin da ya faru ya rigaya ya faru		
21	Ina bayyana yanayin da nake ji maras daɗi		
22	Ina ƙoƙarin samun natsuwa daga fannin addinina ko sauran ababuwan da na yi imani da su		
23	Ina ƙoƙarin samun shawarwari ko taimako daga wasu kan abin da ya kamata na yi		
24	Ina sabawa da zama cikin yanayin		
25	Ina yin tunani sosai game da matakin da ya kamata na ɗauka		
26	Ina zargin kai na game da ababuwan da suka faru		
27	Ina yin addu'a		
28	Yanayin ya zame min wani abin wasa		

Translated with permission, from the original English version developed by Carver (1997). Carver, C. S. (1997). You want to measure coping but your protocol's too long: Consider the brief. International Journal of Behavioral Medicine, 4(1), 92–100.

### Appendix 11. Insomnia Severity Index (ISI) Application

Attn: Professor Charles M. Morin Department of Psychology, Laval University Director, Centre d'étude des troubles du sommeil Canada Research Chair in Sleeping Disorders Dear Professor Charles,

#### **Request for Approval for the use of Insomnia Severity Index (ISI)**

I am a PhD student at the School of Nursing, the Hong Kong Polytechnic University. I am writing to seek your approval for the use of scale Insomnia Severity Index (ISI) for my project titled 'Effect of a Programme of African Circle Dance (ACD) on Depressive Symptoms in Internally Displaced Persons in Africa: A Quasi-Experimental Study'. I may translate it into the Hausa language (i.e. the second largest spoken language in Africa).

Thank you for your attention and consideration. I am looking forward to receiving your reply. Yours respectfully, Dauda Salihu A133 Centre for Gerontological Nursing School of Nursing The Hong Kong Polytechnic University Hung Hom, Kowloon Hong Kong (SAR), China Phone: (852) 6763 (Mobile); 2766 7880 (Office) (234) 803401 (Nigeria)

#### Appendix 12. Insomnia Severity Index (ISI) Approval

#### SALIHU, dauda [Student]

From: Sent: To: Subject: Charles M. Morin <cmorin@ Friday, 14 June 2019 9:42 PM SALIHU, dauda [Student] RE: REQUEST

>

Permission is granted to use and translate the ISI in your research. Good luck. Charles Morin

De : SALIHU, dauda [Student] <dauda.salihu@ Envoyé : 14 juin 2019 08:45 À : Charles M. Morin <cmorin@ > Objet : REQUEST

Dear Professor Charles, attached is my request letter. Kind Regards Dauda SALIHU

THE HONG KONG THE HONG KONG 的UYTECHNIC UNIVERSITY 香港理工大學

/ Opening Minds • Shaping the Future • 意連思能 • 成就未来

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#### Appendix 13. DASS-21 Application & Approval

SALIHU, dauda [Student] Peter Lovibond <p.lovibond@ From: Sent: Monday, 10 June 2019 7:54 AM To: SALIHU, dauda [Student] Subject: **RE: ENQUERY** Dear Dauda, Yes you are welcome to go ahead with a Hausa translation, as per our usual procedure explained in FAQ#25 on the DASS website www.psy.unsw.edu.au/dass/ Best regards, Peter Lovibond From: SALIHU, dauda [Student] [mailto:dauda.salihu@ 1 Sent: Sunday, 9 June 2019 5:24 PM To: Peter Lovibond <p.lovibond@ Subject: ENQUERY Dear Lovibond, I am writing to enquire about the process of getting permission to translate the DASS-21 tool. I am a PhD student with the School of Nursing, the Hong Kong Polytechnic University. My project titled 'Effect of a Programme of African Circle Dance (ACD) on Depressive Symptoms in Internally Displaced Persons in Africa: A Quasi-Experimental Study' is to be conducted in the Maiduguri the epicentre of Boko Haram crisis in North-Eastern Nigeria. I wanted to translate the tool into Hausa (i.e. the second largest spoken language in Africa). Please guide me on who to formerly address my application to. Regards DAUDA SALIHU THE HONG KONG POLYTECHNIC UNIVERSITY 香港理工大學 Opening Minds • Shaping the Future • 致建思维 • 成就未来

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Item	Expert	Number in	Item										
	1	2	3	4	5	6	7	8	9	10	11	agreement	CVI
1	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
2	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
3	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
4	Х	Х	Х	Х	Х	Х	Х	Х	0	Х	Х	10	0.9
5	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
6	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
7	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
8	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
9	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
10	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
11	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
12	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
13	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
14	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
15	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
16	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
17	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
18	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
19	Х	Х	Х	Х	0	Х	Х	Х	Х	Х	Х	11	1
20	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
21	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
Proportion relevant (i.e. mean		1	1	1	0.9	1	1	1	1	1	1 I-CVI was in a to 1.0. Twenty it I-CVI =1.0, an had I-CVI=.9.		range of .9 tems had an d one-item

Appendix 14. Item Level Content Validity Index (Depression Anxiety Stress Scale-Hausa)

Item	Expert	Number	Item										
	1	2	3	4	5	6	7	8	9	10	11	in	CVI
												agreement	
1	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
2	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
3	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
4	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
5	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
6	Х	Х	Х	Х	Х	Х	0	Х	Х	Х	Х	10	.9
7	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
Proportion relevant (i.e. mean expert proportion)	1	1	1	1	1	1	0.9	1	1	1	1	I-CVI was in a .9 to 1.0. Six i an I-CVI =1.0, item had I-CV	range of tems had and one- I=.9.

## Appendix 15. Item Level Content Validity Index (Insomnia Severity Index-Hausa)

Item	Expert	Number in	Item										
	1	2	3	4	5	6	7	8	9	10	11	agreement	CVI
1	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
2	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
3	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	10	.9
4	Х	Х	Х	Х	Х	Х	Х	Х	0	Х	Х	11	1
5	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
6	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
7	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
8	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
9	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
10	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
11	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
12	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
13	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
14	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
15	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
16	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
17	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
18	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
19	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
20	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
21	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
22	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
23	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
24	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
25	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
26	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1

# Appendix 16. Item Level Content Validity Index (Brief COPE scale-Hausa)

27	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
28	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х	11	1
Proportion relevant (i.e. mean expert proportion)	1	1	1	1	1	1	1	1	0.9	1	1	I-CVI was to 1.0. Two had an I-CV item had I-	in a range of .9 enty seven items VI =1.0, and one- CVI=.9.

# Appendix 17. TREND Checklist

Paper	Item	Descriptor	Reported	Page
section/topic	No			and line
Mathada				numbers
Participants	3	• Elizibility outonic for	1	
1 articipants	5	Eligibility chiena loi     participanta	~	
		including criteria at		
		different levels in		
		different levels in		
		rlan (o.g. oitios		
		plan (e.g., cities,		
		Mathad of magnitude at (a second	1 (	
		• Method of recruitment (e.g., referra	1, <b>√</b>	
		self-selection), including the sampling	9	
		was implemented	.11	
		Boornitmont		
		• Recruitment	V	
		Settings and locations where the de		
		• Settings and locations where the da	ta 🗸	
Interventions	4			
Interventions	4	• Details of the	$\checkmark$	
		interventions		
		intended for each		
		study condition and		
		now and when they		
		administered		
		specifically		
		including:		
		Content: what was given?		
		<ul> <li>Content: what was given:</li> <li>Delivery method: how was the context</li> </ul>	v at (	
		o Derivery method. now was the conten		
		$\circ$ Unit of delivery: how were the		
		subjects grouped during delivery?		
		$\circ$ Deliverer: who delivered th		
		intervention?		
		• Setting: where was the intervention	n 🗸	
		delivered?	•	
		• Exposure quantity and duration: how	w 🗸	
		many sessions or episodes or even	ts	
		were intended to be delivered? How	W	
		long were they intended to last?		

		0	Time span: how long was it intended	$\checkmark$	
			to take to deliver the intervention to		
			each unit?		
		0	Activities to increase compliance or		
			adherence (e.g., incentives).		
Objectives	5	•	Specific objectives and hypotheses	$\checkmark$	
Outcomes	6	•	Clearly defined primary and secondary outcome measures	✓	
		•	Methods used to collect data and any methods used to enhance the quality of measurements	✓	
		•	Information on validated instruments such as psychometric and biometric properties	✓	
Sample size	7	•	How sample size was determined and, when applicable, explanation of any interim analyses and stopping rules	√	
Assignment Method	8	•	Unit of assignment (the unit being assigned to study condition, e.g., individual, group, community)	✓	
		•	Method used to assign units to study conditions, including details of any restriction (e.g., blocking, stratification, minimization)	√	
		•	Inclusion of aspects employed to help minimize potential bias induced due to non-randomization (e.g., matching)	$\checkmark$	
Blinding (masking)	9	•	Whether or not participants, those administering the interventions, and those assessing the outcomes were blinded to study condition assignment; if so, statement regarding how the blinding was accomplished and how it was assessed.	✓	
Unit of Analysis	10	•	Description of the smallest unit that is being analyzed to assess intervention effects (e.g.,	✓	

r				
		individual, group, or community)		
		• If the writ of analyzig differe from	The unit of	
		• If the unit of analysis unlets nom		
		the unit of assignment, the	assignment	
		analytical method used to account	is same as	
		for this (e.g., adjusting the	the unit of	
		standard error estimates by the	analysis.	
		design effect or using multilevel		
		analysis)		
Statistical	11	• Statistical methods used to	$\checkmark$	
Methods		compare study groups for primary		
		methods outcome(s), including		
		complex methods of correlated		
		data		
		<ul> <li>Statistical methods used for</li> </ul>	./	
		additional analyses such as a	v	
		subgroup analyses, such as a		
		adjusted analysis		
		• Methods for imputing missing data, if	$\checkmark$	
		used		
		• Statistical software or programs used	$\checkmark$	
Results				
Participant flow	12	• Flow of participants	$\checkmark$	
		through each stage of the		
		study: enrollment.		
		assignment allocation		
		and intervention		
		exposure follow up		
		exposure, fonow-up,		
		anarysis (a diagram is		
		strongly recommended)		
		o Enrollment: the numbers of	$\checkmark$	
		participants screened for		
		eligibility, found to be		
		eligible or not eligible,		
		declined to be enrolled, and		
		enrolled in the study		
		o Assignment: the numbers	$\checkmark$	
		of participants assigned to		
		a study condition		
		o Allocation and intervention	$\checkmark$	
		exposure: the number of		
		participants assigned to each		
		study condition and the		
		number of participants who		
		received each intervention		
	1			
		o Follow-up: the number of participants who completed the follow-up or did not complete the follow-up (i.e., lost to follow-up), by study condition	✓ ✓	
-------------------------	----	---	---	
		participants included in or excluded from the main analysis, by study condition	V	
		<ul> <li>Description of protocol deviations from study as planned, along with reasons</li> </ul>	There was no protocol deviation.	
Recruitment	13	Dates defining the periods of recruitment and follow-up	$\checkmark$	
Baseline Data	14	• Baseline demographic and clinical characteristics of participants in each study condition	✓	
		<ul> <li>Baseline characteristics for each study condition relevant to specific disease prevention research</li> </ul>	$\checkmark$	
		• Baseline comparisons of those lost to follow-up and those retained, overall and by study condition.	✓	
		<ul> <li>Comparison between study population at baseline and target population of interest</li> </ul>	NA	
Baseline Equivalence	15	• Data on study group equivalence at baseline and statistical methods used to control for baseline differences	✓	
Numbers Analyzed	16	• Number of participants (denominator) included in each analysis for each study condition, particularly when the denominators change for different outcomes; statement of the results in absolute numbers when feasible	✓	
		• Indication of whether the analysis strategy was "intention to treat" or, if not, description of how non- compliers were treated in the analyses	✓	

Outcomes and Estimation	17	<ul> <li>For each primary and secondary outcome, a summary of results for each estimation study condition, and the estimated effect size and a confidence interval to indicate the precision</li> <li>Inclusion of null and negative findings</li> </ul>	✓ ✓ ✓	
		• Inclusion of results from testing pre-specified causal pathways through which the intervention was intended to operate, if any	NA	NA
Ancillary Analysis	18	<ul> <li>Summary of other analyses performed, including subgroup or restricted analyses, indicating which are pre-specified or exploratory</li> </ul>	NA	NA
Adverse Events	19	• Summary of all important adverse events or unintended effects in each study condition (including summary measures, effect size estimates, and confidence intervals)	✓	
DISCUSSION	1		•	T
Interpretation	20	• Interpretation of the results, taking into account study hypotheses, sources of potential bias, imprecision of measures, multiplicative analyses, and other limitations or weaknesses of the study	✓	
		• Discussion of results taking into account the mechanism by which the intervention was intended to work (causal pathways) or alternative mechanisms or explanations	✓	
		• Discussion of the success of and barriers to implementing the intervention, fidelity of implementation	✓	
		• Discussion of research, programmatic, or policy implications	<b>√</b>	
Generalizability	21	• Generalizability (external validity) of the trial findings, taking into account the study population, the characteristics of	✓ 	

	the intervention, length of follow- up, incentives, compliance rates, specific sites/settings involved in the study, and other contextual issues		
Overall Evidence	• General interpretation of the results in the context of current evidence and current theory	$\checkmark$	

	Muna Garage IDPs camp (A)	Teachers Village IDPs camp (B)	Variations/similaritie s
Population	39,560 persons (7,332 households)	31,019 persons (6,033 households)	Camp B has fewer people compared to A
Size	397,000m2	Maximum capacity is 10,000 persons	Camp B is smaller in size
Location	Outskirt of Maiduguri on private land (unsafe for stay)	Within the metropolis of Maiduguri (safer to stay)	Camp B is a better environment
Security/ Risks	<ol> <li>Lacked a fence wall.</li> <li>A spontaneous site with porous borders, fluid movement of people (extreme congestion)</li> <li>Availability of military/civilia n Joint task post outpost within the camp.</li> <li>Fire outbreaks and flooding.</li> <li>A high number of female-headed households.</li> <li>Unaccompanie d children and elderly persons.</li> </ol>	<ol> <li>It has a better- fenced wall.</li> <li>Congestion of people and an insufficient number of shelters.</li> <li>Availability of military/civilian Joint task post outpost within the camp.</li> <li>Visitors/vehicul ar registration are needed at the entry point.</li> <li>Occasional issuance of identification cards to residents for entry and exits.</li> </ol>	On safety, camp B is better

## Appendix 18. Differences between the Muna Garage & Teachers' Village Camps

Camp	Borno State Emergency Management Agency	Same for all camps
managemen	(SEMA) with the support of the United Nations	
t	agencies and Non-Governmental Organizations	

# Appendix 19. African Circle Dance (ACD) Programme Physical Activity Log

#### Name: Week of:

Day & date	Activity # of minute	Activity # of minute	Activity # of minute	Activity # of minute	Total # of minutes
Example:					
Sunday 28/01/2019	Soccer 60 minutes	Walking 30 minutes	Climbing trees 15 minutes	Running 20 minutes	125 minutes
Monday					
Tuesday					
Wadnaaday					
wednesday					
Thursday					
1 101 5 0 0 3					
Friday					
Saturday					
Sunday					

### Appendix 20. African Circle Dance Programme Post Intervention Survey

Perception of the ACD programme (tick the appropriate option)

1. What is your satisfaction level of the overall programme?

Rating	Options	Response
0	Not at all helpful	
1	Slightly helpful	
2	Moderately helpful	
3	Very helpful	
4	Extremely helpful	

2. Regarding the ACD programme, what is the perceived usefulness of the brief health educational part to improve your mood ?

Rating	Options	Response
0	Not at all helpful	
1	Slightly helpful	
2	Moderately helpful	
3	Very helpful	
4	Extremely helpful	

3. Regarding the ACD programme, what is the perceived usefulness of the ACD dance part to improve your mood?

Rating	Options	Response
0	Not at all helpful	
1	Slightly helpful	
2	Moderately helpful	
3	Very helpful	
4	Extremely helpful	

4. Regarding the programme, what is the perceived usefulness of the sharing session after the dance ?

Rating	Options	Response
0	Not at all helpful	
1	Slightly helpful	
2	Moderately helpful	
3	Very helpful	
4	Extremely helpful	

5. How often do you dance after the specialist session?

No	Options	Response
0	Never	
1	Once weekly	
2	Twice weekly	

3	Three times per week	
4	More than four times per week	

### Appendix 21. Intervention Fidelity Checklist

Intervention Fidelity Monitoring Checklist										
Date:										
No	The aspect of compliance or effectiveness being monitored	Monitoring method	Responsibility for monitoring (job title)	Likert Scale						
				1	2	3	4	5		
1	Subjects interact with one another									
2	Subjects following the dance rhythm of the music	Observation	Dance therapist							
3	How many sessions delivered			A nun	nber of	session	s:			

Note: Research student and his supervisors will review the findings and monitor completion of any resulting action plan.

## Appendix 22. Trial Process of the ACD programme

	<b>Baseline Treatment Phase</b>							Follow-up		
Tasks	Week						<b>_</b>			
	-2 to 0	1	2	3	4	5	6	7	8	9 to 12
Informed consent	Х									
Obtain participant's	$\mathbf{v}$									
Assent	Λ									
Intervention										
ACD Dance		Х	Х	Х	Х	Х	Х	Х	Х	
Brief health education		Х			Х					
Control										
Brief health education		Х			Х					
Outcomes										
#Depression	Х								Х	Х
#Anxiety	Х								Х	Х
#Stress	Х								Х	Х
Process monitoring										
Compliance		Х	Х	Х	Х	Х	Х	Х	Х	
Reasons fo	or	$\mathbf{v}$								
withdrawal		Λ	Λ	Λ	Λ	Λ	Λ	Λ	Λ	
Adverse events/safety		Х	Х	Х	Х	Х	Х	Х	Х	

ACD: African Circle Dance, #measured by Depression, Anxiety Stress Scale (DASS-21).

#### Appendix 23. Process evaluation\_focus group interview guideline

1. Tell me how you're feeling about overall programme?

Prompt : the first & second education session of ACD programme? (usefulness; easy to understand ; Easy to follow )

The dance part prompt: satisfaction? enjoyment? usefulness?

The sharing part after dance prompt: satisfaction? enjoyment? usefulness? Prompt: Any strength or limitation? Any effect on sleep / mood.

- 2. How often you do ACD other than the class Prompt: Why/ why not?
- 3. What types of your exercise do you do in the past month? How was it helpful/not helpful?
- 4. What aspects of ACD program do you want to be improved? Prompt: ACD frequency, duration, others
- 5. What are the perceived factors in maintenance yourself being active/good mood?
- 6. Any suggestions for improvement?

Variables	Time	Control (n=98)	Intervention	GxT	interaction	G	Т	Cramer's V	p-value
		Mean (SE)	(n=100)	effects					-
			Mean (SE)	β (95% CI)	)				
Depressive	symptom	s - Unadjusted							
	T0	25.2 (0.4)	27.7 (0.4)						
	T1	13.8 (0.7)*	9.7 (0.7)*	-6.6 (-8.73	, -4.41)				<.001
	T2	12.7 (0.8)*	11.6 (0.4)*	-3.5 (-5.51)	, -1.47)	.051	<.001		.001
Anxiety - U	Jnadjuste	d							
	T0	23.2 (0.8)	23.6 (0.6)						
	T1	13.9 (0.8)*	15.8 (0.7)*	1.4 (-1.53,	4.26)				.355
	T2	12.4 (0.8)*	14.9 (0.6)*	2.0 (-0.74,	4.71)	.011	<.001		.153
Stress - Un	adjusted								
	T0	21.8 (0.7)	21.2 (0.6)						
	T1	5.5 (0.3)*	3.0 (0.3)*	-1.9 (-3.94	, 0.11)				.064
	T2	9.6 (0.5)*	5.7 (0.4)*	-3.3 (-5.46	, -1.15)	<.001	<.001		.003
Insomnia-U	U <b>nadjuste</b>	d							
	T0	17.1 (0.6)	11.7 (0.4)						
	T1	10.7 (0.7)*	10.1 (0.6)*	4.8 (2.34, 7	7.20)				<.001
	T2	8.0 (0.4)*	8.3 (0.5)*	5.7 (3.80, 7	7.66)	<.001	<.001		<.001
	T0	13.5 (4.1)	19.1 (3.8)						
	T1	16.5 (4.0)*	19.2 (3.9)*	-2.8 (-4.85,	, -0.73)				0.008
	T2	18.2 (4.0)*	17.8 (3.8)	-6.0 (-8.12,	, -3.82)	<.001	.001	.28	<.001
Emotion-fo	ocused Co	ping-Unadjusted							
	T0	26.0 (0.5)	28.6 (0.3)						
	T1	23.7 (0.5)	28.9 (0.3)*	2.5 (0.87, 4	.19)				.003
	T2	23.4 (0.6)	31.6 (0.2)*	5.5 (3.83, 7	7.22)	<.001	.013		<.001
Dysfunctio	nal-focuse	ed Coping-Unadjus	ted						

Appendix 24. Effects of the ACD interventions on depression, anxiety, stress, social supports and coping strategies

TO	25.4 (0.5)	23.6 (0.3)				
T1	23.7 (0.4)	25.6 (0.2)*	3.6 (2.16, 5.09)			<.001
T2	23.4 (0.5)	25.4 (0.2)*	3.8 (2.30, 5.40)	.014	.794	<.001
Problem-focused	l Coping-Unadjuste	ed				
T0	15.7 (0.3)	17.8 (0.2)				
<b>T</b> 1	13.6 (0.3)	16.4 (0.2)	0.8 (-0.30, 1.83)			1.161
T2	12.7 (0.3)	17.1 (0.3)	2.2 (1.05, 3.43)	<.001	<.001	<.001

\*Significant; M: Mean; SE: Standard Error; β (Beta coeficient); G: Group; T: Time; GxT: Group\*Time; CI: Confidence Interval