A FACE-TO-FACE PEER SUPPORT MODEL FOR PATIENTS WITH TYPE 2 DIABETES

By

Melanie Pienaar

2003062094

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Promotor: Dr Marianne Reid

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DECLARATION

I, Melanie Pienaar, hereby declare that the work submitted in this thesis (interrelated published and publishable articles), is my independent work and that I have not previously submitted it for a qualification at another institution of higher education.

I am, furthermore, aware that copyright is vested in the University of the Free State. A written agreement between the UFS and the student is submitted in lieu of the declaration by the student (Addendum A).

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Melanie Pienaar

31 July 2020

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LANGUAGE EDITING CERTIFICATE

Declaration

21 July 2020

Hester Sophia Human
PO Box 4
Otjiwarongo
Namibia

Student: Melanie Pienar

Study title: A face-to-face peer support model for patients with type 2 diabetes

I confirm that I edited this document, checked the references, and made recommendations for changes to the text.

DEDICATION

This work is dedicated to my dad, William Edward:

Dad, you are free now…

I miss you every day.

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SUMMARY

Background: Prevalence of Type 2 diabetes has reached pandemic proportions globally. New and effective ways are needed to improve diabetes self-management. However, many barriers to self-management exist, such as lack of support, lack of resources, geographical constraints and lack of knowledge, which may be fuelling the increase of Type 2 diabetes. Face-to-face peer support may have the potential to improve self-management in Type 2 diabetes.

Purpose: The purpose of the study was to establish the feasibility of a face-to-face peer support model for patients with Type 2 diabetes in a sub-district in the Free State province of South Africa.

Methods: Multiple research methods, guided by the integrated model of behaviour prediction, were used to establish the feasibility of a developed face-to-face peer support model developed for patients with Type 2 diabetes.

In the first stage of the study, a systematic review, guided by the steps of the Cochrane Collaboration (2006), was conducted to critically synthesise the best available evidence on face-to-face peer support models for adults with Type 2 diabetes in low and middle-income countries. Multiple data sources were consulted for the period January 2000 to December 2017. Screening and selection of papers followed, as well as critical appraisal and data extraction, by at least two reviewers and, finally, narrative synthesis was done. The synthesised data of the systematic review informed the pilot of the face-to-face peer support model.

The second stage of the study established the impact of the implemented face-to-face peer support intervention on adults with Type 2 diabetes in South Africa. A cluster randomised control trial was conducted involving adults with Type 2 diabetes from six communities in a semi-urban rural area in the Free State province. Three communities were randomly allocated to the intervention group and three to the control group. Trained community health workers provided monthly group sessions and home visits to the intervention group. The control group received their usual care. The primary outcome of the study was taken as glycated haemoglobin measured by the BioHermes Automatic Glycohemglobin Analyzer; secondary outcomes were blood pressure, waist

circumference and body mass index. Outcomes were assessed at baseline and after four months. Descriptive statistics was determined per group.

The last stage of the study determined the experiences of the patients with Type 2 diabetes who took part in the face-to-face peer support intervention. Sesotho-speaking women who participated in the face-to-face peer support intervention were purposively sampled, and took part in this visual-based narrative inquiry. Textual and visual data was collected using the Mmogo-method® and data was analysed thematically.

Results: In the systematic review, Stage 1 of the study, two common models of face-to-face peer support were identified for low and middle-income countries, namely, diabetic patients and community health workers. Essential components were highlighted for the planning and implementation of these models, such as recruitment, selection, training and supervision of peer supporters, as well as the nature of the peer intervention.

The cluster randomised controlled trial study, Stage 2 of the study, resulted in a significant improvement in diastolic blood pressure of individuals (P=0.02) in the intervention group. No differences were, however, found from baseline between groups regarding the variables glycated haemoglobin (P=0.87), systolic blood pressure (P=0.13), body mass index (P=0.21) and waist circumference (P=0.24).

The Mmogo-method®, Stage 3 of the study, showed that the participants valued the face-to-face peer support intervention and acknowledged community health workers as an important source of support to them. Participants expressed that the intervention helped them to make positive lifestyle changes, and because they were exposed to the support continuously, their confidence in the self-management of diabetes improved.

Conclusions: The study demonstrated that, despite modest results, a face-to-face peer support model for patients with Type 2 diabetes that involves community health workers is feasible and valuable in low and middle-income countries like South Africa.

Keywords: Type 2 diabetes, peer support, self-management, low and middle-income countries, community health workers

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LIST OF ABBREVIATIONS AND ACRONYMS

ART	Antiretroviral treatment
BMI	Body mass index
CHW	Community Health worker
DBP	Diastolic blood pressure
HbA1c	Glycosylated Haemoglobin
IDF	International Diabetes Federation
IMBP	Integrated Model of Behaviour Prediction
LMICs	Low and middle-income countries
NCD	Non-communicable diseases
NGO	Non-governmental organisation
SBP	Systolic blood pressure
SEMDSA	Society for Endocrinology, Metabolism & Diabetes of South Africa
SMS	Short message service
T2D	Type 2 Diabetes
TNB	Thaba Nchu Botshabelo
USA	United States of America
USAID	United States Agency International Development
USD	United States Dollar
WBPHCOT	Ward-based primary healthcare community outreach team
WHO	World Health Organisation

CONCEPTUAL AND OPERATIONAL DEFINITIONS

BLOOD PRESSURE: Blood pressure refers to the force at which blood flows through the blood vessels. Blood pressure can be categorised as follows:

- Normal: systolic blood pressure (SBP) <120 mmHg and diastolic blood pressure (DBP) <80 mmHg;
- Elevated: SBP 120-129 mmHg and DBP <80 mmHg;
- Stage 1 hypertension: SBP 130-139 mmHg or DBP 80-89 mmHg;
- Stage 2 hypertension: SBP ≥140 mmHg or DBP ≥90 mmHg; and
- Hypertensive crisis: SBP >180 mmHg or DBP >120 mmHg (American Heart Association, 2017).

The researcher aligned herself with this definition in the study and measured blood pressure using the Omron Intellisense Blood Pressure Monitoring System.

BODY MASS INDEX (BMI): BMI may be used to assess a patient's weight status, and refers to the weight (in kg) of a person divided by his/her height (m) squared. *A reading below 18.5 indicates underweight; 18.5-24.9 indicates a normal range; 25-29.9 indicates overweight and 30 and above indicates obesity* (Centers for Disease Control and Prevention, 2018). In this study, the researcher aligned herself with this definition and used a SECA digital electronic scale to measure patients' weight and a SECA stadiometer to measure the height of patients.

CLUSTER RANDOMISED CONTROL TRIAL: A cluster randomised control trial involves randomisation of groups (clusters) of individuals to the intervention and the control group (Hemming et al., 2017). The researcher aligned herself with this definition in stage 2 of the study.

EXPERIENCES: According to the Merriam-Webster Dictionary (2020), experiences refers to knowledge, skills and practices resulting from personal participation in activities. In this study, the experiences of patients who participated in the face-to-face peer support intervention were of value to the researcher.

FEASIBILITY: According to the *Complex Interventions Framework* of the United Kingdom's Medical Research Council (2008), feasibility is assessed by testing the acceptability of procedures, estimating the likely rates of recruitment and retention of subjects and determining approximate sample sizes. The researcher did not align

herself with this definition, and used the integrated model of behaviour prediction's determinants to measure feasibility, which led to improved self-management of diabetes in the study.

GLYCOSYLATED HAEMOGLOBIN: Glycosylated haemoglobin, referred to as HbA1c, and is a standard blood test that reflects the average blood glucose levels over a period of 2-3 months. The test is regarded as the "gold standard" for clinical management of diabetes mellitus (World Health Organization, 2016a). The range of HbA1c in a patient with Type 2 diabetes is ≥6.5% (SEMDSA, 2017). In this study, the researcher aligned herself with this definition and used the BioHermes Automatic Glycohemoglobin Analyzer, applying standard techniques and controls, to determine the HbA1c levels of patients with Type 2 diabetes.

IMPACT: According to Hearn and Buffardi (2016), impact refers to the change that is brought about by an intervention. In this study, the researcher was guided by this definition and established the impact of a face-to-face peer support model by means of HbA1c testing; blood pressure, body mass index and waist circumference measurements, as well as by the experiences of the patients who took part in the face-to-face peer support intervention.

PEER SUPPORT: Peer support refers to

> *the provision of emotional, appraisal, and informational assistance by a created social network member who possesses experiential knowledge of a specific behaviour or stressor and similar characteristics as the target population, to address a health-related issue of a potentially or actually stressed focal person (Dennis, 2003:329).*

Key functions of peer support include assistance in the daily management of diabetes, social and emotional support, linkage to resources, and ongoing support (Peers for Progress, 2014). In this study, the researcher used community health workers as peer supporters since community health workers lived and worked in the same area as the patients they served.

PEER SUPPORT MODEL: A peer support model refers to peer support interventions or programmes led or provided by the healthcare professional, the expert patient and/or the community health worker. A peer support model enables patients to improve their

control over their health, and provides meaningful opportunities for patients to help others facing similar situations (Heisler, 2006:4). In stage 1 of the study, a suitable peer support model for patients with T2DM, based on the provider, will be identified, and developed and implemented in Stage 2.

SELF-MANAGEMENT: Self-management describes activities performed by the individual to maintain health although ongoing disease was present (Rochfort *et al.*, 2018). In Type 2 diabetes, self-management activities include choosing a healthy diet, physically activity, managing stress and taking prescribed medication. In this study, self-management was indicated by HbA1c, blood pressure, waist circumference and body mass index, as well as by the experiences of the patients who took part in the face-to-face peer support intervention.

TYPE 2 DIABETES: Type 2 diabetes is a metabolic disorder characterised by long-term hyperglycaemia and disturbances of carbohydrate, fat and protein metabolism due to defects in “insulin secretion, insulin action or both” (SEMDSA, 2017). In this study, all the participants had been diagnosed with Type 2 diabetes by a physician based on the SEMDSA guideline.

WAIST CIRCUMFERENCE: Waist circumference refers to the minimum abdominal circumference, measured midway between the lower rib margin and the iliac crest (Tovee, 2012). *The cut-off point that indicates risk for waist circumference in women is >80 cm and >94 cm in men*, as recommended for the sub-Saharan population (Alberti *et al.*, 2006). The researcher aligned herself with this definition and used a measuring tape to determine the waist circumference of patients in the study.

PREAMBLE

The format of this thesis is according to the recommendations for a PhD through interrelated publishable articles, as guided by the Faculty of Health Sciences of the University of the Free State, South Africa.

The thesis unfolds in six chapters. Chapter 1 is an introduction to the study and provides an overview of the entire study. Chapter 2 provides a discussion of the phenomenon of interest, namely, Type 2 diabetes and face-to-face peer support. The next three chapters, Chapter 3 to 5, are interrelated, publishable and published articles. Each article addresses a specific research objective, in order to answer the research question posed by the study:

- Article 1: To synthesise the best available evidence on face-to-face peer support models for adults with Type 2 diabetes in low and middle-income countries (Stage 1).
- Article 2: To develop a face-to-face peer support model for patients with type 2 diabetes in the Free State province (Stage 2), and
- To establish the impact of the face-to-face peer support model in patients with Type 2 diabetes with regard to: a) HbA1c; b) blood pressure; c) waist circumference and d) body mass index (Stage 2).
- Article 3: To determine the experiences of the patients that received the face-to-face peer support intervention (Stage 3).

The researcher presents her work in these three stages. Each of the three articles (Chapters 3 to 5) are presented with specific details related to the journal to which each article was submitted, the publication status of the article and the associated addenda related to the article. Each article concludes with its own reference list.

The thesis is concluded by Chapter 6, which presents the conclusions, recommendations and limitations of the study. Due to the interrelatedness of the articles and their contribution to the development of the model, there may be some concepts that occur throughout the thesis.

SCHOLARLY CONTRIBUTIONS FROM THE STUDY

STAGE	PUBLICATIONS	PRESENTATIONS
STAGE 1: SYSTEMATIC REVIEW	Pienaar, M. & Reid, M. A face-to-face peer support model for adults with Type 2 diabetes: A systematic review. Submitted to *BMC Public Health* Under review	Pienaar M. & Reid M. 2019. *A face-to-face peer support model for adults with Type 2 diabetes: A systematic review.* Oral presentation at the Annual Research Forum of the Faculty of Health Sciences of the University of Free State, Bloemfontein. August.[1] Pienaar M. & Reid M. 2019. *A face-to-face peer support model for adults with Type 2 diabetes: A systematic review.* Oral presentation at the Public Health Association of South Africa (PHASA) Conference, Cape Town. Pienaar, M., Reid, M. A face-to-face peer support model for adults with Type 2 diabetes: A systematic review. ICCH 2019, 27-30 October, San Diego, USA (Poster).
STAGE 2: INTERVENTION STUDY	Pienaar, M., Reid, M. & Nel, M. The impact of a face-to-face peer support intervention on adults with Type 2 diabetes: a cluster-randomised trial. Submitted to *JEMDSA* Under review	
STAGE 3: VISUAL-BASED NARRATIVE INQUIRY, MMOGO-METHOD®	Pienaar, M. & Reid, M. A diabetes peer support intervention: Patient experiences using the Mmogo-method®. Submitted to *Health SA Gesondheid* Under review	

[1] Presentation was awarded “Best Educational Paper: Junior Category”

CHAPTER 1
OVERVIEW OF THE STUDY

1.1 BACKGROUND

This study was the second phase of a multiphase project, guided by the United Kingdom's Medical Research Council's Complex Interventions Framework (2008). The first phase, the *development phase* of the project, was conducted between 2014 and 2016, to develop a health dialogue model for patients diagnosed with Type 2 diabetes (T2D) attending identified public health services in the Free State province of South Africa (Reid *et al.*, 2018). The development, as depicted in Figure 1.1, manifested in four primary studies and a two-day workshop with a multi-professional expert research team, to synthesise the data from the mentioned studies and to design a health dialogue model. More detail related to the primary studies that formed part of the development phase are provided below.

1. ***Health dialogue: A concept analysis:*** The concept analysis was guided by the steps of Walker and Avant (2011) and included literature between 2000 and 2013. Health dialogue is described as an "equal and symbiotic health relationship between the patient and the health-care provider, with reciprocal health communications geared to reaching a recognised health objective via a health message" (Reid *et al*., 2018). The consequence of health dialogue is that it may enhance health outcomes. Analysis of the data resulted in a conceptual map of health dialogue, consisting of antecedents, characteristics, empirical referents and consequences (Reid, 2019). This conceptual map guided the development of a health dialogue model for patients with T2D in the Free State.
2. ***Integrative review: Communication strategies for adults with chronic disease in low and middle-income countries (LMICs):*** The integrative review was guided by the seven steps of the Cochrane Collaboration (2006). The following review question was asked: Which communication strategies are used during effective health dialogue among adults with chronic diseases? The sub-questions were the following: How was health communication conducted? When was health communication conducted?

What health communication was conducted? Where was health communication conducted? Who conducted the health communication? Data was analysed by means of thematic summaries, and data synthesis led to the following concluding statements related to the review questions:

How? Effective health dialogue with adults with chronic disease in LMICs may be brought about by using a range of strategies, including one-on-one, group and computerised communication.

When? Regular communication strategies are recommended.

What? Communication strategies should be focused and specifically related to the individual or group.

Where? Communication should occur in an opportune and private location.

Who? Various individuals may conduct health communication, among whom trained lay persons and/or professional healthcare workers, and by means of computer technology (Reid *et al.*, 2018; Pienaar, 2016).

3. ***Diabetes-related knowledge, attitude and practices (KAP) of adults with T2D, as well as of health-care providers caring for patients with diabetes:*** This study comprises two quantitative observational studies. The populations were (i) patients with T2D, who were older than 18 years and who attended public health facilities in the Free State (Le Roux *et al.*, 2018), and (ii) nurses and community health workers (CHWs) who provided care to patients with T2D (Hassan, 2016). Sampling followed a systematic approach and the following centres were selected through stratified sampling techniques: community health centres (N=10) in the five districts of the Free State, and primary health clinics (N=12) in one district in the Mangaung Metropolitan Municipality. Bloemfontein, Thaba Nchu and Botshabelo constituted the strata in the Mangaung Metropolitan Municipality. This district was selected because it had the most primary health clinics in the Free State district (Van Rensburg *et al.*, 2012). Convenience sampling was applied and 255 adult patients, 60 nurses and 46 CHWs were included in the study. An amended version of the South African Diabetes Knowledge, Attitude and Practices questionnaire was used to collect data on demographics and related

factors, quality of life and knowledge, attitude and practices, anthropometry and perceived care (Bradley, 1994). Poor knowledge, an undesirable attitude and poor practices related to diabetes were found in the patients with T2D (Le Roux *et al.*, 2018). Despite encouraging results in the healthcare providers, training to improve knowledge and practices was recommended (Hassan, 2016).

4. ***Perceptions of patients regarding diabetes-related health communication strategies in the Free State, South Africa:*** A descriptive, exploratory, qualitative design was used, using the same public health facilities selected for the knowledge, attitude and practices study (No. 3 above). Purposive sampling identified patients diagnosed with T2D who were attending these health facilities; their perceptions regarding diabetes-related health communication strategies were explored through semi-structured interviews. After 34 interviews, data saturation was achieved. Data was analysed through inductive reasoning and thematic analysis. Guidance and self-management were the two themes that emerged. An important factor related to guidance was acknowledgement of the importance of communication with healthcare providers. There was, however, a need for health information to be specific to the needs of the patient, especially in terms of language, and providing an opportunity for the patient to ask questions based on the health information. Certain perceived barriers prevented patients from being open and asking questions. However, patients with diabetes shared information with other patients with diabetes in the waiting room and they benefited greatly from this interaction. The casual platform allowed sensitive issues to be discussed in an informal manner. It became clear that patients' understanding of health information may be affected by other patients and the potential effect that this may have on self-management. The support of family was also considered important for self-management (Nyoni & Reid, 2019).

Three focus areas were identified by the data synthesis of the mentioned studies in the development phase of the project, namely, 1) Improving community awareness regarding diabetes; 2) The use of face-to-face communication, such as peer support, to promote the self-management of T2D in patients, or the use of technological

support such as mobile health devices, and 3) Creating a diabetes training platform for healthcare providers caring for patients with T2D.

The second phase allows piloting the various components of the developed health dialogue model. This study pilots the use of a face-to-face peer support model as a self-management strategy for patients diagnosed with T2D.

Figure 1.1 positions the current study within the complex intervention – see the blue box in the centre, Phase 2.

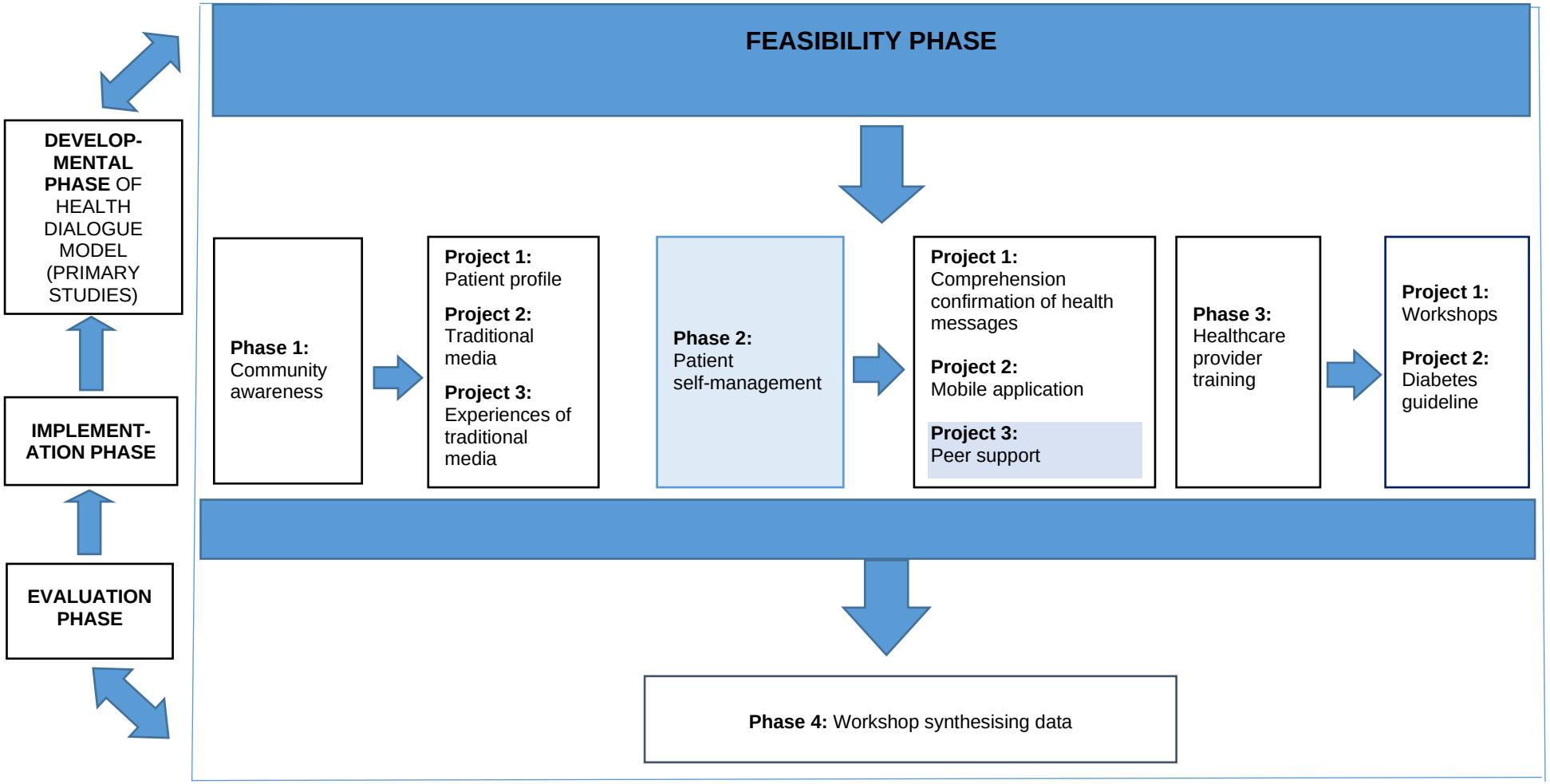

Figure 1.1: Positioning of the current study within the complex intervention as Phase 2, Project 3

Source: Medical Research Council (2008) Complex Interventions Framework

1.2 INTRODUCTION

According to the International Diabetes Federation, diabetes is one of the greatest health emergencies of the 21st century (IDF, 2019). Approximately 463 million adults live with diabetes globally, with an additional 378 million adults suspected to have impaired glucose tolerance, which puts them at high risk of developing the disease. If this increase is not stopped, about 700 million people will be living with the disease by 2045. Without effective prevention and management programmes, the impact will continue to increase globally (IDF, 2019).

In this complex and long-term disease, positive outcomes may be achieved by effective patient self-management (Carpenter *et al.*, 2019). Mose and Guzman-Corrales (2013:4) note that "*patient level factors account for 98% of glucose management in T2D, while physicians account for only 2% of diabetes management"*. Self-managing T2D encompasses great responsibility and effort for patients and their families. This entails activities such as modifying the diet, incorporating physical exercise into the daily routine, taking medication as advised, monitoring blood glucose levels; taking special care of the feet; regular visits to the healthcare provider, recognising and responding to warning signs, and making the right decisions regarding healthcare (Society for Endocrinology, Metabolism & Diabetes of South Africa (SEMDSA), 2017; World Health Organization (WHO), 2016a; Peers for Progress, 2014). In addition to the challenges involved in performing these daily tasks, many people with T2D worry about their future health and possible complications of the disease. Having to face these burdens without support may make living with T2D even more difficult, or even intolerable (Funnell, 2011).

Continuous support is crucial for effective self-management of T2D. The WHO has identified peer support as a particularly promising way of providing continuous support in the self-management of T2D (De Vries *et al.*, 2014; WHO, 2007). Peer support is defined as support provided by an individual who has experience of a similar condition or circumstances as the patient (Dennis, 2003).

The fundamental functions of peer support include assistance in daily management of diabetes, social and emotional support, linkage to resources and ongoing support

(Aziz *et al.*, 2018; Peers for Progress, 2014). In addition to various functions of peer support, peer support can also take on many forms, such as phone calls, text messaging, one-on-one or group meetings, internet-based support, home visits, volunteer-based or professional-led support (Peers for Progress, 2014). Research substantiates the promising nature of peer support in T2D.

Systematic reviews of the literature demonstrate that peer support for patients diagnosed with T2D results in an improvement in key clinical indicators, such as glycosylated haemoglobin (HbA1c), lipid profiles and blood pressure (Patil *et al.*, 2016; Qi *et al.*, 2015). Other individual studies confirmed the effectiveness of providing face-to-face peer support in T2D by way of community health providers (Spencer *et al.*, 2018); trained diabetic patients (Thom *et al.*, 2013) and structured peer group intervention (Smith *et al.*, 2011). Heisler (2006) posits that face-to-face contact is the most beneficial in terms of patient outcomes. Evidence also shows that face-to-face peer support has the potential to reduce hospitalisation, readmissions, visits to the healthcare provider and out-of-pocket costs, reduce health disparities, increase culturally sensitive management, increase overall health and wellness, and enhance community support services (Peers for Progress, 2014).

1.3 PROBLEM STATEMENT

According to the WHO (2016b), South Africa has a population of approximately 54,5 million people, of whom 9.8% have been diagnosed with diabetes. The high incidence of T2D and other chronic diseases has escalated the rates of morbidity and mortality, which is crippling the economy (WHO, 2016a; Le Roux, 2016). In the Free State, like the rest of the country, the high mortality relative to the prevalence of T2D is an indication of unsatisfactory healthcare delivery for T2D (Bradshaw *et al.*, 2007). The Free State, which is the second-smallest province in the country, has a population of 2.8 million people (Statistics South Africa, 2016a). Despite its small size, a study conducted in the Free State by Groenewald *et al.* (2009) found that 7.6% of the population in this province had diabetes mellitus at the time of the research.

It became clear that patient self-management is not optimal in patients with T2D in the Free State province of South Africa and, in order to address the pandemic of

T2D, patient self-management needs to be strengthened. The development phase of the project also highlighted the patients' inclination for individual- and group-based communication, as well as peer interaction, to improve their understanding of T2D (Reid et al, 2018). The feasibility of a developed face-to-face peer support model, developed as a self-management strategy for T2D, needed to be piloted.

1.4 RESEARCH QUESTION

The current research attempted to answer the following question: How feasible is a developed face-to-face peer support model developed for patients with T2D in a subdistrict in the Free State province in South Africa?

1.5 OBJECTIVES

The objectives of the study were:

- To synthesise the best available evidence on face-to-face peer support models for adults with T2D in low and middle-income countries (LMICs) (Stage 1);
- To develop a face-to-face peer support model for T2D in the Free State province (Stage 2); and
- To establish the impact of the face-to-face peer support model in patients with T2D with regard to: (i) HbA1c; (ii) Blood pressure; (iii) Waist circumference; and (iv) Body mass index (BMI) (Stage 2); and
- To determine the experiences of the patients who received the face-to-face peer support intervention (Stage 3).

1.6 THEORETICAL UNDERPINNING OF THE STUDY

As stated, this study is part of a larger study that is guided by the United Kingdom's Medical Research Council's Complex Interventions Framework (2008). One of the components of a complex intervention is identifying a theory basis that can guide the study (Carpenter *et al.*, 2019). The integrated model of behaviour prediction (IMPB) was used to conceptualise the study, due to its potential to effect behaviour change. Figure 1.2 sets out an adapted version of the IMBP as a diagram.

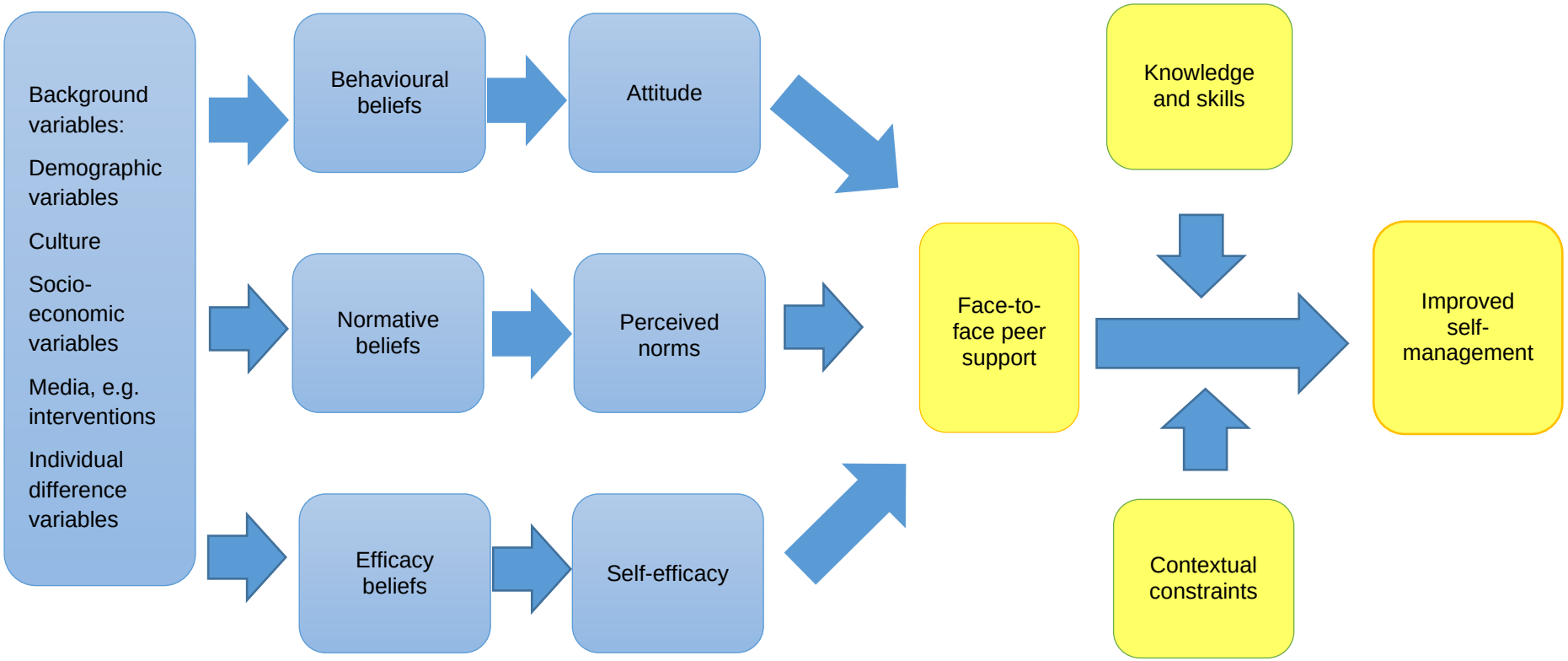

Figure 1.2: Adapted model of behaviour prediction

Source: Adapted from Fishbein and Yzer (2003)

The IMBP is an extension of the theory of reasoned action (Ajzen, 1985) and the theory of planned behaviour (Fishbein & Yzer, 2003). The model predicts that, if an individual has a strong **intention** to carry out a behaviour, is equipped with **knowledge and skills,** and there are no **environmental factors** preventing the individual from performing the behaviour, then the behaviour will probably be carried out (Fishbein & Cappella, 2006).

Furthermore**, intention** is determined by three major variables, namely, attitude, subjective norm and self-efficacy (Yzer, 2011). **Attitude** refers to the individual's thoughts and feelings regarding performing the behaviour. **Perceived norm** refers the social pressure to perform the behaviour. The IMPB identifies two types of perceived norms: injunctive norms and descriptive norms. **Injunctive norm** refers to the extent to which social networks support the individual to perform the behaviour, and **descriptive norm** refers to the extent to which members of the social networks perform the behaviour themselves. **Self-efficacy** reflects an individual's belief in his/her capacity to perform the behaviour. The models recognise that these three variables are direct predictors that represent specific beliefs about the particular behaviour, as depicted in Figure 1.2.

The IMBP emphasises that **background variables,** such as demographic, culture and individual differences, are possible sources of beliefs and may affect behaviour indirectly. Those beliefs may, then, affect behavioural determinants and, ultimately, influence intention to perform the behaviour (Yzer, 2011). The IMBP is mindful of the unique needs of the population and acknowledges the need to identify relevant beliefs and outcomes of the population that will be investigated (Fishbein, 2008). In this study, a developed face-to-face peer support model could serve as a strategy to develop self-management skills and minimise contextual constraints.

1.7 PRAGMATISM AS RESEARCH PARADIGM

A paradigm is the world view of the researcher (Botma *et al.*, 2010). This world view constitutes beliefs or practices that influence the way the researcher sees the world, and how he/she interprets and acts within the world (Kivunja & Kuyini, 2017).

In the current study, the researcher adopted a pragmatic paradigm for the research study. Pragmatism has a high regard for reality and considers "what works" (Johnson

& Onwuegbuzie, 2004) and focuses on solving practical problems in the “real world” (Feilzer, 2010). Researchers are not bound to a specific philosophy, and can use mixed approaches to answer research questions, which is, in this case, how feasible is a developed face-to-face peer support model developed for patients with T2D in a sub district in the Free State province in South Africa? With pragmatism, it is imperative that the most appropriate research methods are used to answer the research question (Rahi, 2017).

The ontological, epistemological and methodological philosophical assumptions are discussed next in relation to the application of the paradigmatic perspective.

Ontology: The ontological assumption focuses on what constitutes reality (Scotland, 2012). According to the pragmatic paradigm, the researcher was aware of the influences of various stakeholders, resources, infrastructure and contextual realities in the semi-urban rural area of a subdistrict in the Free State province of South Africa. However, what worked in reality, remained the focus. In this study, the researcher assumed a non-singular-reality ontology. Each individual has their own, unique interpretation of reality and there is no single reality (Kivunja & Kuyini, 2017).

Epistemology: The epistemological assumption focuses on the nature of knowledge (Scotland, 2012). In this study, the researcher assumed a relational epistemology. The researcher determined which relationships are appropriate to the study and used the IMBP as the theoretical underpinning of the study, due to its potential to effect behaviour change (Kivunja & Kuyini, 2017).

Methodology: The methodological assumption focuses on how research should be conducted in a specific context in order to answer the research question (Scotland, 2012). In this study, the research assumed a multi-methods methodology and used a combination of quantitative and qualitative research methods to answer the research questions (Kivunja & Kuyini, 2017).

1.8 RESEARCH DESIGN

This study followed a multi-methods design. The design suited the study, because it consisted of various stages. In Stage 1, a systematic review was conducted to synthesise the best available evidence on face-to-face peer support models for adults with T2D in LMICs, thereby informing the intervention to be developed and

implemented in Stage 2. This was followed by a cluster randomised controlled trial in Stage 2, during which data collection occurred in the form of pre-and-post-testing of the intervention. In Stage 3, the qualitative study determined the experiences of the patients who took part in the face-to-face peer support intervention, using the Mmogo-method® as a visual-based narrative inquiry. The various stages of the study are indicated in Figure 1.3.

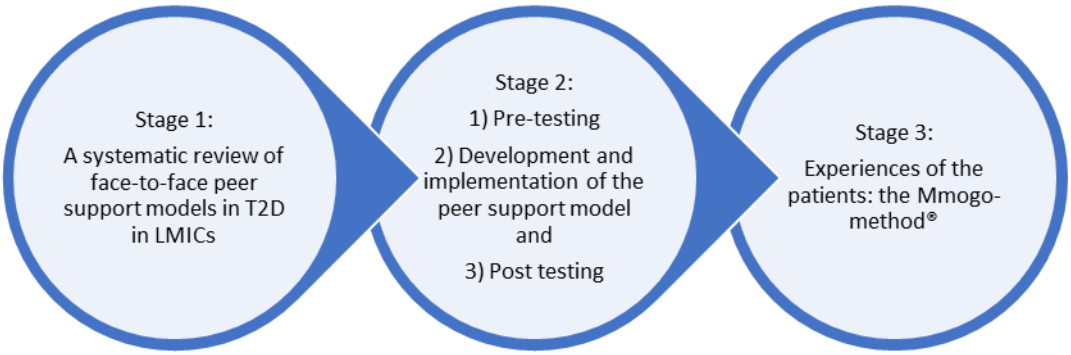

Figure 1.3: The various stages of the study

1.9 OVERVIEW OF THE STAGES OF THE STUDY

Table 1.1 provides an overview of each stage of the study.

Table 1.1: Overview of each stage of the study

Stage 1	Stage 2	Stage 3
RESEARCH OBJECTIVES		
To synthesise the best available evidence on face-to-face peer support models for adults with T2D in LMICs	To develop a face-to-face peer support model for T2D in the Free State province (Stage 2); and To establish the impact of the face-to-face peer support model in patients with T2D with regard to: 1) HbA1c, 2) Blood pressure, 3) Waist circumference, and 4) BMI	To determine the experiences of the patients who received the face-to-face peer support intervention
RESEARCH METHOD		
Systematic review	**Quantitative method**: Cluster randomised controlled trial	**Qualitative method**: Visual-based narrative inquiry, the Mmogo-method®
DATA SOURCES/PARTICIPANTS		
Multiple sources of data, such as electronic data sources, reference list checking and contact with the authors of studies	**Participants** included adults with T2D from six communities in a semi-urban rural area in the Free State **Peer supporters:** CHWs working in the specific communities were recruited as peer supporters	Purposively sampled Sesotho-speaking women who participated in the **face-to-face** peer support intervention
DATA COLLECTION TECHNIQUES		
Systematic review according to the Cochrane Collaboration (2006)	**Patients:** Questionnaires on demographics and quality of life Pre-testing: Clinical parameters at baseline **Peer supporters:** Questionnaire on demographics Peer support intervention **Post-testing:** Clinical parameters after four months	According to the Mmogo-method® steps
DATA ANALYSIS		
Narrative analysis	Continuous and categorical variables	Textual data and visual data were analysed thematically
ANTICIPATED PRODUCTS		
Article1: A face-to-face peer support model for adults with Type 2 diabetes: A systematic review	**Article 2**: The impact of the face-to-face peer support model in patients with T2D with regard to: 1) HbA1c,	**Article 3:** A diabetes peer support intervention: Patient experiences using the Mmogo-method®

Stage 1	Stage 2	Stage 3
	2) Blood pressure, 3) Waist circumference, and 4) BMI	

1.10 QUALITY OF THE STUDY

This section will describe how the researcher ensured the quality and integrity of the study (Burns & Grove, 2011).

1.10.1 Stage 1: Systematic review

Rigour refers to the researcher's degree of accuracy during the research process (Burns & Grove, 2011). The following steps were taken by the researcher to ensure rigour during the systematic review:

- A clearly focused review question was formulated using the population, intervention, comparison and outcome (PICO) format, which is regarded as the gold standard in systematic reviews.
- The inclusion and exclusion criteria were clearly defined and very specific, and provided clear guidance on the selection of studies.
- Using multiple sources of data, such as electronic data sources, reference list checking and contact with the authors of studies, ensured a comprehensive search.
- A librarian with experience of systematic reviews assisted with the choice of electronic databases and platforms and running the search strings.
- Two or more reviewers were involved in filtering studies, critical appraisal and data extraction of papers.
- All literature is traceable and available for auditing purposes**.**

1.10.2 Stage 2: Intervention study

Measurement error refers to the variance between what is measured and the true value (Polit & Beck, 2017). The researcher, therefore, took the following steps to avoid **measurement errors** as far as possible:

- **Inaccurate measurements**: The same equipment was used for taking the measurements on all patients. Equipment was calibrated to increase

measurement reliability. Research assistants were trained to take measurements and to complete questionnaires, to avoid them introducing errors.

- **Invalid and unreliable processes**: The pretesting phase was piloted to make sure that all questions and procedures were clearly understood by participants. All data entered for computer analysis was double-punched and verified.
- **Inconsistent selection process**: Clearly stated inclusion criteria for the participants were applied.

1.10.3 Stage 3: Visual-based narrative inquiry, the Mmogo-method®

The following standards of Lincoln and Guba (1985) relate to trustworthiness and were applied in the study: credibility, transferability, dependability and confirmability.

- **Credibility** was achieved by triangulating textual and visual data during the data analysis process. The researcher and a co-coder independently coded data, which led to themes emerging after consensus discussions. Member checking occurred during group discussions.
- **Transferability** was attained, since the researcher provided a detailed research context.
- Audio recordings made, photographs taken and member checking during group discussions ensured dependability.
- **Confirmability** was achieved through field-notes taken by a research assistant and member checking during group discussions.

1.11 ETHICAL CONSIDERATIONS

The researcher maintained the ethical principles of beneficence, respect for human dignity and justice, as expressed in the Belmont Report, throughout the study (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979). Ethics approval was obtained from the Health Sciences Research Ethics Committee of the University of Free State, UFS-HSD2017/1546 (Addendum C).

- Stage 1: Systematic review: All data utilised in the systematic review is traceable, available and sound, and a paper trail is available, as is required for auditing purposes (Academy of Nutrition and Dietetics, 2016; Centre for Review and Dissemination, 2009). All information retrieved from databases and other sources were handled responsibly and confidentially (Burns & Grove, 2011), which reflects research integrity as promulgated by the Singapore Statement on Research Integrity (World Conferences on Research Integrity, 2010)
- Stage 2: Intervention study: Permission to conduct research was received from the Free State Department of Health (Addendum G). Participants were provided with information leaflets (Addenda J and N), which gave all relevant information about the intended research project and gave the participants the right of self-determination and autonomy after full disclosure. They were also informed that all information shared would be regarded as confidential and that their names would not be used in any report. Informed consent (Addendum K) was signed by all participants. Participants were informed that they could withdraw from the project at any time and that participation was completely voluntarily.
- Stage 3: Visual-based narrative inquiry, Mmogo-method®: The same ethics principles that were applied in Stage 2, were applied in this stage. Additionally, participants were informed that audio recordings would be made, and that they would have to provide informed consent for this (Addendum Q).

1.12 STRUCTURE OF THE THESIS

The thesis is presented in the following six chapters:

Chapter 1 provided a general overview of the study.

Chapter 2 will provide a discussion of T2D and face-to-face peer support.

Chapter 3 will present Article 1: A systematic review of face-to-face peer support models in T2D in LMICs. The article is presented in accordance with guidelines for the journal, *BMC Public Health*.

Chapter 4 will present Article 2: The impact of a face-to-face peer support intervention on patients with T2D. The article format is consistent with guidelines of *JEMDSA*.

Chapter 5 will present Article 3: The experiences of patients that took part in the face-to-face peer support intervention, the Mmogo-method®. The article adheres to the submission guidelines of *Health SA Gesondheid*.

Chapter 6 will provide conclusions, recommendations and limitations of the study.

1.13 SUMMARY

This chapter provided an overview of a study that established the feasibility of a developed face-to-face peer support model developed for patients with T2D in a subdistrict in the Free State province in South Africa? The next chapter will present a discussion of T2D and face-to-face peer support.

CHAPTER 2
TYPE 2 DIABETES AND FACE-TO-FACE PEER SUPPORT

2.1 INTRODUCTION

The first chapter provided a general overview of the study. Chapter 2 will present a discussion on T2D and face-to-face peer support. The content explored in the chapter was linked to results obtained in the various stages of the study. Firstly, the researcher will provide a general overview of T2D in terms of prevalence, diagnostic criteria, impact, global response, the South African response, and medical management. The information will provide a picture of the magnitude of this chronic disease, and the challenges faced in this regard, and will lead to a discussion on the significance of self-management of T2D and peer support as a strategy to improve self-management of T2D. The various modes of peer support will then be addressed, starting with face-to-face peer support, which is one of the focus areas of the study. Aspects such as individual-based contact, group-based contact, recruitment, selection, training, supervision and remuneration of peer supporters as they relate to face-to-face peer support, will be unpacked. This discussion will be followed by information on the two other modes of contact, namely, telephone and web or internet-based contact. The flow of the discussion will then divert to models of peer support, namely, models of support led by professionals, expert patients and CHWs. As CHWs unfolded as another focus area in the study, the way CHWs are integrated into health systems, globally and in South Africa, will be discussed. Various areas representing poor integration in South Africa, such as government support, training and supervision, remuneration, occupational hazards and the readiness of CHWs for their role, will be investigated.

2.2 GENERAL OVERVIEW OF TYPE 2 DIABETES

Diabetes mellitus, commonly called diabetes, is a complex chronic condition that is characterised by elevated levels of blood glucose due to malfunctioning of insulin action, insulin secretion or both (IDF, 2019; SEMDSA, 2017). There are three main types of diabetes, namely, Type 1 diabetes, T2D, and gestational diabetes mellitus. In T2D, which is the focus of the study, the body does not produce enough insulin, or

the body does not respond fully to the insulin, and a degree of insulin resistance may be present (IDF, 2019).

T2D commonly occurs in adults over 30 years of age. However, incidence is increasing rapidly in children, adolescents and young adults, due to obesity related to physical inactivity and poor diet. T2D was previously a disease of affluence; however, it is now common in all life stages, and among all races and classes (Reid *et al.*, 2018; Hanson *et al.*, 2012; Kiberenge *et al.*, 2010). Evidence shows that the factors that place individuals at risk of developing T2D include ethnicity, family history of diabetes, aging, overweight and obesity, unhealthy diet, inactivity and smoking (SEMDSA, 2017; WHO, 2016a). Other factors contributing to the incidence of T2D include urbanisation and an aging population (IDF, 2019; Zheng *et al.*, 2018).

Classic symptoms of T2D include increased thirst and urination, constant hunger, weight loss and fatigue. The onset of T2D is usually slow, resulting in a long pre-detection phase (IDF, 2019). Due to the "*deceptive and asymptomatic nature of the disease"* (Labuschagne *et al.*, 2017: 29), most patients with T2D consult a doctor only after symptoms or complications manifest (Coetzee *et al.*, 2019; SEMDSA, 2017; WHO, 2016a). Brown and Heeley-Creed (2013) add that some patients live with the disease for up to 12 years before they are diagnosed. The next section will describe the prevalence of the disease.

2.2.1 Prevalence of Type 2 diabetes

About 90-95% of diabetes cases is T2D (IDF, 2019; SEMDSA, 2017; WHO, 2016a). While many studies refer simply to diabetes, and not specifically T2D, we should note that the studies may possibly be referring to T2D, as T2D makes up the majority (90-95%) of cases. Diabetes currently affects more than 425 million people globally, of whom one third are people over 65 years. A further 352 million people are at risk of developing diabetes due to impaired glucose tolerance. It is expected that the incidence of diabetes in adults will increase by 55% by 2040. LMICs are disproportionally affected by diabetes and carry 80% of the disease burden (IDF, 2019; Abdullah *et al.*, 2014).

South Africa has a population of approximately 55,4 million people (WHO, 2016b), of which 7.7% of men and 11,8% of women have been diagnosed with diabetes. It is

estimated that approximately 60% of the total population is unscreened and undiagnosed (Erzse *et al.*, 2019; Labuschagne *et al.*, 2017). It is of interest that South Africa has the highest obesity levels in sub-Saharan Africa, and obesity is a risk factor related to T2D (Statistics South Africa, 2016b). Having defined the pandemic extent of T2D, the criteria for diagnosis will now be given.

2.2.2 Diagnostic criteria of Type 2 diabetes

T2D is diagnosed by assessing the glucose level in the plasma and is defined by authoritative bodies such as the American Diabetes Association (2019); IDF (2019) and WHO (2016a) as:

- Fasting plasma glucose of 7.0 mmol/L (126 mg/dL) or higher; or
- 2 Hour-post load glucose of 11.1 mmol/L (200 mg/dL) or higher; or
- A random glucose of 11.1 mmol/L (200 mg/dL) or higher; or
- HbA1c measurement of 48 mmol/mol (6.5%) or higher.

SEMDSA (2017) concurs that no test is superior to another. In order to confirm a diagnosis, the same test must be repeated on another day, unless there are undeniably high blood glucose levels and related hyperglycaemic symptoms. It is also recommended that formal laboratory analysis confirms diagnosis.

HbA1c is considered to be the gold standard for monitoring glycaemic control in T2D (Hsu *et al.*, 2018; WHO, 2016a). HbA1c gives an indication of the average plasma glucose over approximately three months, while the other three tests reflect the plasma glucose at that specific moment. HbA1c does not require fasting, and a HbA1c of >7.5% is a strong indicator of diabetes-related complications (Schnell *et al.*, 2017). However, HbA1c is expensive to administer and, consequently, not freely available, especially in LMICs and, therefore, the other three tests are recommended (WHO, 2016a). It is also important to realise that certain conditions, such as major blood loss, pregnancy, chronic anaemia and recent transfusions, can influence HbA1c interpretation (Egbujie *et al.*, 2018; Schnell *et al.*, 2017; Fox *et al.*, 2015). This section described the diagnostic criteria of T2D. In the next section, the researcher will provide insight into the impact of the pandemic.

2.2.3 Impact of Type 2 diabetes

"Diabetes kills and disables, striking people at their most productive age, impoverishing families or reducing the life expectancy of older people" (IDF, 2017:42)

Chronically raised blood glucose levels in T2D leads to long-term damage and complications for certain organ systems of the body (Arambewela *et al.*, 2018; WHO, 2016a), including microvascular complications, such as damage to the eyes, damage to the nervous and renal systems, and macrovascular complications, such as ischaemic heart disease, stroke and peripheral vascular disease (Forouhi & Wareham, 2014). Peripheral vascular disease, in turn, causes slow healing of wounds and gangrene, which could, eventually, require amputation. Literature shows that many patients experience complications even before the diagnosis of diabetes (Arambewela *et al.*, 2018; Beagley *et al.*, 2014). A study conducted in Finland on the prevalence of chronic kidney disease in adults with T2D, showed that nearly 70% of patients with T2D treated at the primary care centre had some sign of chronic kidney disease, and nearly half of all the patients with T2D had significant chronic kidney disease (Metsärinne *et al.*, 2015).

Cardiovascular complications are currently the primary cause of mortality and morbidity in patients with diabetes (Arambewela *et al.*, 2018), developing 14,6 years earlier than expected, and more severely than usual (Zheng *et al.*, 2018). Arambewela *et al.* (2018) specify that cardiovascular complications account for more than 70% of mortality in people with diabetes. In 2015, approximately five million people between the ages 20 and 79 globally died from diabetes. This parallels approximately one death every eight seconds (IDF, 2019). Additionally, Mutyambizi *et al.* (2019) report that, in 2016 in South Africa, diabetes was the second leading underlying cause of death, after tuberculosis. In addition to the devastating physical impact of T2D, other areas of people's lives are also affected.

At present, individuals with T2D may also face worse outcomes from Covid-19. When individuals with T2D develop viral infections, like Covid-19, it may be more difficult to treat, because of fluctuations in blood glucose levels and the presence of diabetes-related complications (IDF, 2020).

The chronic nature of the T2D causes a significant economic burden on the economy of a country (IDF, 2019). Economic effects include high medication and health facility costs, loss of income due to absenteeism from work, and reduced productivity; related depression and premature disability and mortality (Arambewela *et al.*, 2018; WHO, 2016a; Manyema *et al.*, 2015). The total healthcare expenditure on people with diabetes aged 20 to 79 increased more than three times in the period 2007 to 2017, increasing from 232 billion USD to more than 727 billion USD (IDF, 2019). These losses have a crippling effect on an economy (WHO, 2016a; Kiberenge *et al.*, 2010).

The economic implications of T2D is devastating for a middle-income country like South Africa. In 2016, 44% of all deaths in South Africa were attributable to non-communicable diseases (NCDs); 6% of these deaths were attributable to diabetes and 77% of these deaths involved people younger than 60 (IDF, 2019; WHO, 2016b). A study that estimated the direct annual cost to the public sector for 240 000 patients with T2D who had been diagnosed, treated and controlled, amounted to 2,7 billion ZAR (198 million USD). This accounted for 1.6% of the 2018 South African health budget. However, if treatment is expanded to all people with T2D who are in need of care, the cost will account for 12% of the national health budget (Erzse *et al.*, 2019). After the discussion of the devastating impact of T2D, the global response to T2D will be described next.

2.2.4 Global response to Type 2 diabetes

T2D is one of four NCDs – the others are cardiovascular disease, cancer and chronic respiratory disease – that global leaders are giving precedence, as affirmed by the 2011 United Nations High-Level Meeting on the prevention and control of NCDs. Global leaders acknowledged that a coordinated multisectoral approach by countries is needed to address diabetes and other NCDs (WHO, 2011). This meeting led to the WHO Global Action Plan for the prevention and control of NCDs, 2013 – 2020, a monitoring framework with global objectives and targets introduced by the General Assembly in 2013. Some of the objectives included a 25% decrease in mortality due to NCDs; a 10% decrease in hazardous alcohol consumption; a 10% decrease in physical inactivity, and termination of the progression of obesity and

diabetes (WHO, 2016a). This detailed action plan obligates member states to report progress on national NCD action plans at the General Assembly.

More importantly, The Global Diabetes Plan 2011-2021 was launched at this meeting in 2011 (IDF, 2012). The fundamental aspects of successful diabetes management that were prioritised in the plan include:

- Providing essential medicines, supplies, technology and services to people with diabetes;
- The establishment and maintenance of cyclic clinical assessment;
- The provision of self-management education to people with diabetes and/or their carers; and
- The implementation of nationally standardised protocols to trace individuals at risk of diabetes (IDF, 2012).

Since this section highlighted the global response to T2D, the next section will follow-up on the response of South Africa to T2D.

2.2.5 South African response to Type 2 diabetes

South Africa was one of the 193 signatory countries at the 2011 United Nations High-Level Meeting on the prevention and control of NCDs. The Department of Health of South Africa, consequently, implemented a strategic plan on the prevention and control of NCDs (Department of Health, S.A., 2014). This plan sets out objectives and targets to be reached by 2020 in terms of the prevention and control of NCDs and the attainment of "*A long and healthy life for all"*.

Despite these efforts, the country's health system remains fragile, with inadequate resources to meet the demands of T2D. In the wake of a quadruple burden of disease and high rates of infectious diseases, NCD, maternal and child mortality, and injury-related disorders, South Africa has had a slow response to the diabetes crisis, due to an overburdened public health system, which serves 80% of the population, who lack health insurance (Erzse *et al.*, 2019).

Inadequate political and multisectoral commitment is tangible in the South African health system, as is inadequate management ability (Maphumulo & Bhengu, 2019; Nxumalo *et al.*, 2016; Dookie & Singh, 2012). Access to essential medicines, equipment and supplies are poor, and there is a shortage of staff (Coetzee *et al.*,

2019; Maphumulo & Bhengu, 2019; Dookie & Singh, 2012). Little to no patient education is available (Levitt *et al.*, 2011), and a high patient load prevails daily in overfull health facilities (Hughes *et al.*, 2006). Often, health workers were not adequately trained, and management guidelines are not used optimally. Health workers are demotivated, and language barriers and low patient literacy levels aggravate this situation (Werfalli *et al.*, 2019; Hughes *et al.*, 2006; Whiting *et al.*, 2003). These problems lead to short consultation times and inadequate recordkeeping (Atun *et al.*, 2017; Levitt *et al.*, 2011; Hughes *et al.*, 2006). Additionally, patients with diabetes commonly demonstrate poor diabetes-related knowledge, negative attitudes and unhealthy practices (Le Roux *et al.*, 2018).

A study by Stokes *et al.* (2017), on the prevalence and unmet diabetes care needs of South African patients diagnosed with diabetes found that screening, diagnosis and treatment processes were poor. Factors, such as poor health education and poor medication adherence by patients, were identified as contributing to poor treatment effect. Furthermore, a lack of diabetes proficiency amongst healthcare providers and a shortage of medication at healthcare facilities were identified. Other factors that lead to unmet diabetes needs included insufficient access to healthcare services due to poor socio-economic conditions, lack of health insurance, and travelling costs to get to the healthcare facility. This glum picture of the South African response to T2D leads to a discussion on the medical management of T2D.

2.2.6 Medical management of Type 2 diabetes

Early detection is the key to effective T2D management. An individualised plan of treatment is usually the medical point of departure. This plan may include the initiation of oral medication or insulin injections; consideration of cardiovascular disease risk medication; regular screening of blood glucose levels; systematic examinations for early detection of complications, and referral to secondary or tertiary care (WHO, 2016a).

The WHO Model List of Essential Medicine includes the following diabetes-related drugs for diabetes management: short-acting insulin, intermediate-acting insulin, metformin, gliclazide, and glucagon (IDF, 2019). Essential medicines refer to the basic medicines required to secure the healthcare needs of the population. However,

it is acknowledged that insulin is not readily accessible in many parts of the world (IDF, 2019). A multi-country prospective study involving 22 countries, ranging from high to low-income countries, examined the availability and affordability of metformin, sulfonylureas and insulin in various regions of the world (Chow *et al.*, 2018). The study found that insulin was available in 93,8% of pharmacies in high-income countries; 40.2% of pharmacies in upper-middle-income countries; 29.3% of pharmacies in lower-middle-income countries and 10.3% of pharmacies in lower-income countries. India was an exception among lower-income countries, with 76.1% of pharmacies having insulin available.

In South Africa, there are three pharmacological preparations available for the management of T2D, namely, biguanides, sulfonylurea and insulin (Department of Health, S.A., 2014). The American Diabetes Association (2019:92) acknowledges that the biguanide, metformin, is the first-line drug when initiating pharmacological management of T2D. It is "*safe, effective, inexpensive and may reduce cardiovascular risks".* Metformin is associated with improvements in glycaemic control, assists with weight loss, and causes fewer incidences of hypoglycaemia (Labuschagne *et al.*, 2017).

Sulfonylurea is the second-line drug for T2D, and can be used in combination with metformin and a third agent. Sulfonylurea is associated with improvements in microvascular complications, but should be used with caution, especially in elderly people, due to its tendency to cause hypoglycaemia (Labuschagne *et al.*, 2017). Its unpredictability in multidrug use should also be noted (Department of Health, S.A., 2014).

Insulin can be considered when there is continuous catabolism, when an individual exhibits symptoms of hyperglycaemia, and a blood glucose level of 300 mg/dL (16.7 mmol/L) or HbA1c of ≥10% (86 mmol/L) persists (American Diabetes Association, 2019; SEMDSA, 2017). In addition to medical treatment, people living with T2D must possess several self-management skills.

2.2.7 Self-management of Type 2 diabetes

According to SEMDSA (2017), diabetic self-management education involves an ongoing process of teaching individuals with T2D to manage their disease. It

involves continuously acquiring information, skills and motivation in the self-management of T2D, and requires personal ownership and involvement by the patient with T2D. Primary diabetic self-management education is, ideally, the responsibility of trained healthcare professionals, such as doctors, nurses, dieticians or pharmacists. Personnel at the healthcare facility, or other community-based resources, such as trained peer supporters, family members and CHWs may provide ongoing diabetes education and support (Powers *et al.*, 2015). The cornerstone of care in T2D is self-management.

Self-management refers to self-care activities that an individual performs to remain healthy, despite ongoing disease (Carpenter *et al.*, 2019; Rochfort *et al.*, 2018). In the life of a patient with T2D, self-care activities include choosing a healthy diet, regular physical activity, taking medication correctly, monitoring blood glucose levels and making health decisions based on presenting signs (Hsu *et al.*, 2018; Ayala *et al.*, 2015; Van der Wulp *et al.*, 2012). Literature acknowledges that T2D self-management is complex and requires a lifetime commitment and, because it involves behaviour change, it may be physically and emotionally demanding (Carpenter *et al.*, 2019; Yin *et al.*, 2015).

Many patients with chronic diseases, such as T2D, cannot manage the condition on their own (Ramkisson *et al.*, 2017; Boothroyd & Fisher, 2010). Patients experience the whole situation as stressful and overwhelming and factors such as multiple co-morbidities, lack of knowledge, poor social support and limited financial resources make matters worse (Lott *et al.*, 2019; Simmons *et al.*, 2015). Ahola and Groop, (2013) identified various individual and environmental factors that can be regarded as barriers to T2D self-management that need to be addressed (see Figure 2.1). Ideally, diabetes self-management education and support should overcome these barriers to self-management (Powers *et al.*, 2015).

Individual factors	Environmental factors
Poor knowledge and health literacy	Poor social support
Lack of empowerment	
Lack of motivation and self-efficacy	Socio-economic factors, e.g., poverty
Distorted health beliefs	
Poor coping and problem-solving skills	Increased distance from healthcare facility
Poor locus of control	
Depression, anxiety	Other competing interests and duties
Forgetfulness	
Excessive alcohol use	Limited access to healthcare services
Multiple co-morbidities	providers

Figure 2.1: Barriers that influence T2D self-management

Source: Adapted from Ahola and Groop (2013)

Literature reports that, when patients with T2D are supported with self-management, it leads to improved levels of knowledge and empowerment that may cause patients to display healthy behaviour. This may bring about improved self-care and lead to improved health, better quality of life and reduced complications and lower related health costs (Ahmadi *et al.*, 2018; Aziz *et al.*, 2018; Rochfort *et al.*, 2018; Powers *et al.*, 2015; Ahola & Groop, 2013).

According to Carpenter *et al.* (2019), the individual usually makes self-management plans in collaboration with healthcare professionals. Since self-management makes up about 95% of care (Mahfouz & Awadalla, 2011; WHO, 2007), ongoing support throughout the life of the patient with T2D is essential – not only at the time of diagnosis (Baksi *et al.*, 2008; Gorawara-Bhat *et al.*, 2008; SEMDSA, 2017). In this respect, peer support has been identified as a promising strategy to improve self-

management in patients with T2D (De Vries *et al.*, 2014; WHO, 2007) due to its continuity, flexibility and accessibility (Peers for Progress, 2014).

2.3 PEER SUPPORT

Peer support is supplemental support to the usual care received from healthcare professionals (Rochfort *et al.*, 2018; Gatlin *et al.*, 2017). Peer support involves *"emotional, appraisal and informational"* support by an individual who has lived knowledge, experience or similar circumstances as the patient (Dennis, 2003:329). The appropriateness of peer support in the self-management of T2D will be explored next.

2.3.1 Rationale of peer support

Dennis (2003) identified three defining elements of peer support, namely, "*emotional, appraisal and informational support*". *Emotional* support includes caring, empathy, acceptance and encouragement. A*ppraisal* support includes affirming emotions, thoughts and behaviour. *Informational* support includes providing advice and information to the patient relevant to problem-solving and decision-making (Egbujie *et al.*, 2018; Werfalli *et al.*, 2015; De Vries *et al.*, 2014; Ahola & Groop, 2013; Dennis, 2003). Other authors added *instrumental support* as another element of peer support. They state that instrumental support includes linking the patient with possible practical resources or opportunities that could be explored (Egbujie *et al.*, 2018; Urichuk *et al.*, 2018; Van Dam *et al.*, 2005).

The American Academy of Family Physicians Foundation established Peers for Progress, a global initiative aimed at accelerating best practices in peer support in health. Since 2009, it has funded programmes in many countries all over the world, with the aim of strengthening the evidence base of peer support. Consequently, Peers for Progress defines peer support not by standardised implementation protocols, but by standardised key functions of support (Peers for Progress, 2015; Boothroyd & Fisher, 2010). The key functions of peer support include the following:

- Assistance in daily management: Assistance in daily management may be displayed by providing and reinforcing information with regard to diet, exercise and medication adherence, to help the patient manage diabetes daily. It

involves helping with the “how to do” instead of the “what to do” (Simmons *et al.*, 2015).

- Providing social and emotional support: Social and emotional support may be displayed by listening to, accepting and encouraging the patient and sharing experiences and knowledge with the patient (Peers for Progress, 2014). These important functions of peer support help the patient to develop coping skills that can motivate the patient to change behaviour.
- Promoting and supporting regular linkage to clinical care and community resources: Promoting and supporting regular linkage to clinical care and community resources may be displayed by helping patients to navigate the health system and linking to health, social or other community resources (Tsolekile *et al.*, 2014).
- Provision of ongoing and sustained support to assist with the lifelong needs of diabetes self-care management: Providing ongoing and sustained support to assist with the lifelong needs of diabetes self-care management may be displayed by providing continuous follow-up and care to the patient (Aziz *et al.*, 2018; Riddell *et al.*, 2012; Boothroyd & Fisher, 2010; WHO, 2007).

The significance of standardisation of functions, instead of implementation protocols in peer support, relates to provision for flexibility of peer support and recognises the uniqueness of cultures, populations and variations in health systems (Fischer, 2015).

The success of peer support lies in the less hierarchical and more mutually beneficial relationship that manifests in,

- Sharing experiences and knowledge (Krishnamoorthy *et al.*, 2018; Urichuk *et al.*, 2018; Yeung *et al.*, 2018; Riddell *et al.*, 2012);
- Learning and improving problem-solving and coping skills (Ahmadi *et al.*, 2018; Cade *et al.*, 2009);
- Receiving reinforcement of knowledge and skills (Ju *et al.*, 2018; Heisler, 2010);
- Individual empowerment (Krishnamoorthy *et al.*, 2018; Yeung *et al.*, 2018);
- Developing a relationship of trust (Yeung *et al.*, 2018);
- Linking individuals with community and health resources (Urichuk *et al.*, 2018); and

- Social integration (Bartone *et al.*, 2018).

Peer support among patients with the same chronic health problem may benefit both the peer supporter and the patient. For individuals who provide peer support, the "*lived experience"* is endorsed (McColl *et al.*, 2014), which may lead to improved physical health and levels of functioning (Davis *et al.*, 2016; De Vries *et al.*, 2014). A heightened sense of competence and social approval (Dale *et al.*, 2012) may also lead to high levels of self-efficiency, less depression and a better quality of life (De Vries *et al.*, 2014; Heisler, 2006). Simultaneously, the receiver of peer support experiences hope (McColl *et al.*, 2014) and becomes motivated to make lifestyle changes (Van der Wulp *et al.*, 2012; Bahun & Savič, 2011). Despite the obvious benefits of peer support, many uncertainties regarding peer support exist.

Studies in various countries, such as the United States of America (USA), United Kingdom and Canada, investigated peer support for diabetes and had mixed results. Several systematic reviews support the effectiveness of peer support in adults with T2D, based on improvements in HbA1c (Krishnamoorthy *et al.*, 2018; Fisher *et al.*, 2017; Patil *et al.*, 2016; Zhang *et al.*, 2016; Qi *et al.*, 2015). Other reviews conclude that the findings are too limited and inconsistent to justify and recommend peer support for adults with T2D (Gatlin *et al.*, 2017; Dale *et al.*, 2012). Other outcomes that were achieved by peer support include improvements in diabetes knowledge (Gatlin *et al.*, 2017), blood pressure (Krishnamoorthy *et al.*, 2018), self-efficacy (Van der Wulp *et al.*, 2012), physical activity (Sazlina *et al.*, 2015) and diabetes self-care behaviour (Peimani *et al.*, 2018). Various models and modes of peer support have been identified by literature.

2.3.2 Models and modes of peer support

Heisler (2006) recognises the following models of peer support:

- Professional-led group visits with peer exchanges;
- Peer-led self-management training;
- Using peer coaches or mentors;
- Using CHWs;
- Support groups;

- Telephone-based peer support; and
- Web or internet-based peer support.

These models provide an overview of the various dimensions of peer support. The researcher adopted Heisler's model (2007) to provide a richer picture of peer support, as reflected in Figure 2.2. Peer support models also integrate modes of peer support delivery as depicted in literature.

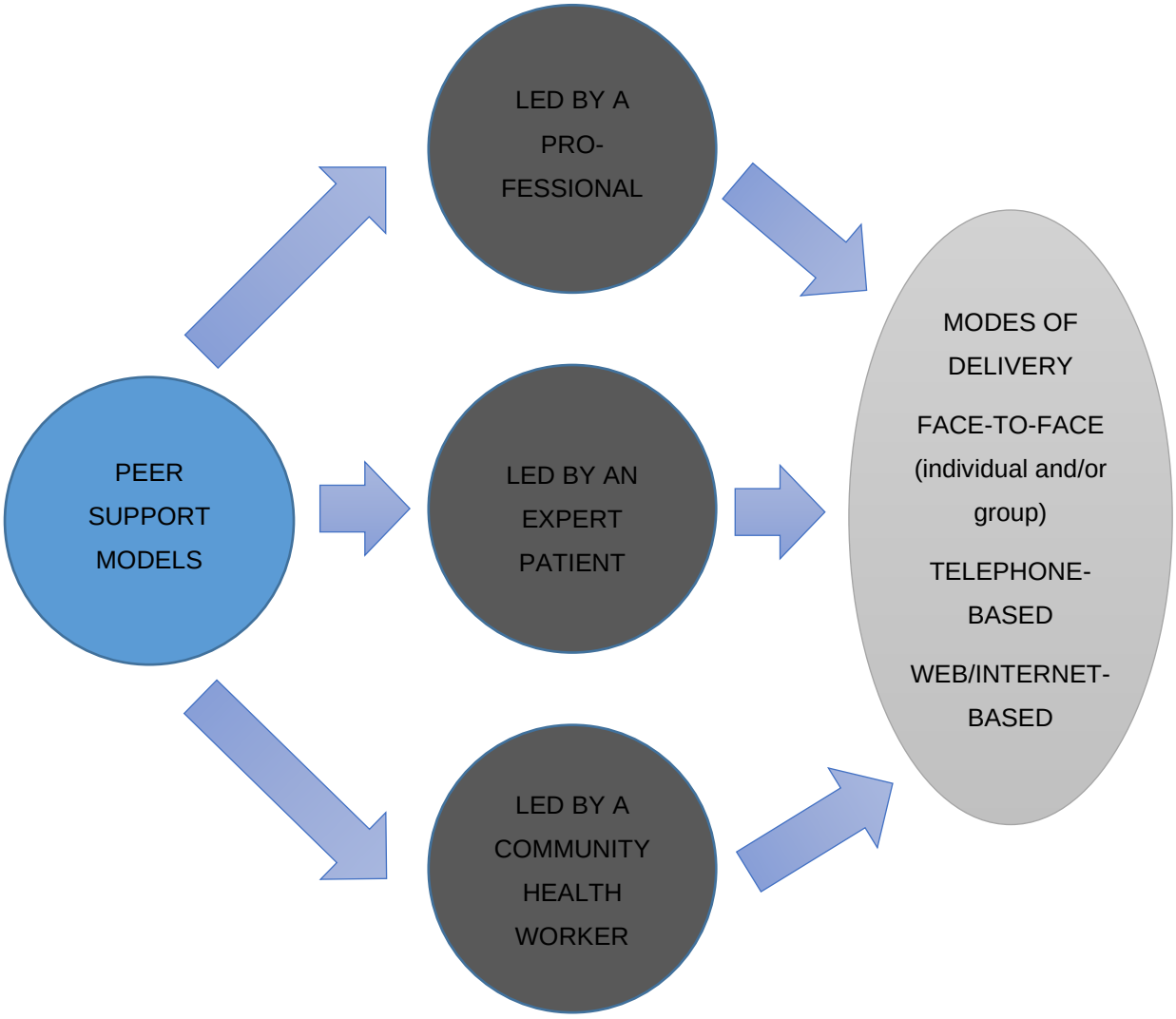

Figure 2.2: Models and modes of peer support

Source: Adapted from Heisler (2006)

The figure illustrates three main models of peer support: peer support led by the healthcare professional, by the expert patient and/or by the CHW. These three

models can deliver the peer intervention in various modes, such as face-to-face (individual or group sessions), telephone and/or web/internet-based contact. Next, the researcher will provide a description of the three modes of peer support.

2.4 MODES OF DELIVERY OF PEER SUPPORT

Since the study focused on face-to-face contact, the discussion will commence with an extensive discussion of face-to-face contact; the other modes of peer support will be mentioned only briefly.

2.4.1 Face-to-face contact

Face-to-face contact is the primary means of sharing health information between the patient and healthcare providers (doctors, nurses, CHWs and counsellors). It is often the preferred source of health information by patients

Ishikawa and Kiuchi (2010); Kreps and Sivaram (2008) and Huber *et al.* (2018) emphasise that the physical presence of another person makes the contact very powerful, and may facilitate active participation in the process. People are able to connect with one another, anxieties are relieved and there is a sense of comfort and caring. It is interesting to note that elderly patients are highly attracted to social support related to face-to-face contact (Huber *et al.*, 2018; Liew *et al.*, 2009).

Face-to-face peer support interventions can be carried out on their own (Mash *et al.*, 2014; Less *et al.*, 2010), or can be supplemented by other modes of contact, such as telephone contact and/or online support (Micikas *et al.*, 2015; Sazlina *et al.*, 2015; Smith *et al.*, 2011). Kreps and Sivaram (2008) advocate using various modes of contact, or a combination of modes of contact, because it increases the impact and efficiency of the message. According to Heisler (2006), face-to-face contact is most beneficial in terms of achieving positive clinical and health outcomes. Unfortunately, high attrition rates are common in face-to-face contact (Merius & Rohan, 2017). An integrative review, conducted on studies done primary in the USA by Merius and Rohan (2017), reports on reasons associated with patient attrition in diabetes self-care interventions. Various self-reported factors were found, among which lack of transport, financial costs, personal responsibilities and scheduling conflicts. Patients have an inclination to withdraw from meetings when they are confronted with life

issues and it is, therefore, important to augment face-to-face peer support with other innovative modes of delivery that are favourable to the target audience, to limit these high attrition rates.

The specific focus of a study on face-to-face peer support was informed by the development of a health dialogue model for patients with diabetes in a semi-urban rural area (Reid *et al.*, 2018). During the development of the model, it was found that patients appreciated communication with trained healthcare workers and other patients with diabetes, in their mother tongue (Nyoni & Reid, 2019). The study reported, furthermore, that patients preferred one-on-one and group-based health communication, that the CHWs had positive attitudes to patients with T2D and that their diabetes-related knowledge and practices were moderate. Face-to-face peer support interventions can take place at the healthcare facility or in the community, and on an **individual or group-based level**.

2.4.1.1 Individual-based contact

Individual sessions refer to one-on-one meetings between the healthcare provider and the patient. The individuals are able to see each other face-to-face, and discuss health-related matters and care (Heisler, 2006). Exchanging information is easier in this mode, and individuals are able to acknowledge each other. The privacy associated with this mode allows participants to discuss personal issues in a comfortable setting, and health information can be tailored to the individual needs of the patient (Fan *et al.*, 2016). However, patients with anxiety issues may feel self-conscious and intimidated in this mode of contact, which creates barriers that may prohibit engagement by the patient (Fan *et al.,* 2016). Cultural, linguistic and health literacy factors can also be barriers to engagement in individual contact (Ahola & Groop, 2013).

2.4.1.2 Group-based contact

Group-based contact refers to meetings between a healthcare provider(s) and a group of patients with the same health problem, to explore health-related issue(s). Literature supports the use of group-based diabetes self-management, due to its positive clinical and health outcomes (Aziz *et al.*, 2018; Odgers-Jewell *et al.*, 2017; Johansson *et al.*, 2016; Simmons *et al.*, 2015; Steinsbekk *et al.*, 2012). Group-based

diabetes sessions are cost-effective interventions, since more time is available for the healthcare provider(s) to discuss relevant information in a group, than would be if individual meetings were held (Essien *et al.*, 2017). It also provides a “safety-net” for patients, who may feel more comfortable and not feel as exposed in a group as in a one-on-one session, and may feel greater freedom to ask questions and make comments in a group (Botes *et al.*, 2013). Consequently, groups are ideal for patients to share experiences, challenges and feelings, and it is an excellent platform to include family and other carers (Steinsbekk *et al.*, 2012).

Disadvantages associated with group-based sessions include the tendency of extroverts to overpower the group and quiet patients to remain quiet. In other words, there may only be a few speakers in a group session (Van Uden-Kraan *et al.*, 2011). It is often difficult to tailor information to match the individual needs of a patient, in a group setting (Fan *et al.*, 2016). In a randomised controlled trial conducted in China by Fan *et al.* (2016), to evaluate the effect of individualised diabetes education of patients with T2D, it was found that individualised diabetes education that is tailored to a patient’s personality was more effective than group education. Ironically, statistically significant reductions were noted in HbA1c, blood pressure and cholesterol in the control group that received group education. This finding suggests that group-based education could be integrated into the management plan for T2D. Additionally, a systematic review of 21 studies conducted by Steinsbekk *et al.* (2012) to evaluate group-based diabetes self-management education, compared to routine treatment, found that group-based diabetes self-management education improves clinical, behavioural and psychosocial outcomes. Literature reports that various elements have to be considered in face-to-face peer support, such as the recruitment, selection, training and supervision of peer supporters.

2.4.1.3 Recruitment of peer supporters

Predetermined criteria and characteristics are important during the recruitment of the ‘ideal’ peer supporter(s), to guide the process. Peer supporters are usually recruited from the communities in which they live by word of mouth, notices at the facility or other forms of advertisement (Sreedevi *et al.*, 2017; Sazlina *et al.*, 2015; Van der Wulp *et al.*, 2012). Members of the healthcare team at the respective facilities may recommend individuals as peer supporters (Peimani *et al.*, 2018; Sazlina *et al.*,

2015), or peer supporters may be selected from diabetes associations (Debussche *et al.,* 2018). Selection criteria may be used to ensure the “ideal” peer supporter(s) are selected.

2.4.1.4 Selection of peer supporters

Some of the desirable characteristics for peer supporters are the following:

- Good glycaemic control (Peimani *et al.*, 2018; Ahmadi *et al.*, 2018);
- Leadership qualities, such as being motivated, possessing good communication skills and decision-making abilities (Ahmadi *et al.*, 2018; Peimani *et al.*, 2018);
- Commitment to the intervention and being available to participate (Van der Wulp *et al.*, 2012);
- Capacity to be trained, and proof of competency (Paz-Pacheco *et al.*, 2017; Van der Wulp *et al.*, 2012);
- Being fluent in local languages (Debussche *et al.*, 2018);
- Possessing compassion and empathy (Peers for Progress, 2015);
- A particular educational level (O’Brien *et al.*, 2009;) and
- Practical experience in the field of peer support (O’Brien *et al.,* 2009).

To ensure that peer supporters are adequately prepared for their role, training is imperative.

2.4.1.5 Training of peer supporters

Training peer supporters is a crucial element of peer programmes (Tsolekile *et al.*, 2018). However, the ”peerness” of peer supporters should be retained, since these supporters are not trained to be para-professionals (Paul *et al.*, 2013). It is important to train peer supporters in the day-to-day realities of the context in which they would find themselves (Centre for Addiction and Mental Health, 2018; Tsolekile *et al.*, 2014).

Literature reports that the way peer supporters are trained differs from programme to programme, depending on the needs of the specific target population and the roles and functions that the peer supporters are to assume (Egbujie *et al.*, 2018; Hunt *et al.*, 2011; Boothroyd & Fisher, 2010; O’Brien *et al.*, 2009) – it is not a case of “one

size fits all". The amount of time dedicated to training determines the success of the programme (USAID, 2015). Important aspects related to training peer supporters will be discussed next, such as who conducts the training, the content covered by training and the theoretical basis of training.

- Peer support training is commonly conducted by diabetes educators (Egbujie *et al.*, 2018; Mash *et al.*, 2014; Baksi *et al.*, 2008), the research team (Peimani *et al.*, 2018), specialists (Paz-Pacheco *et al.*, 2017; Sreedevi *et al.*, 2017; Baksi *et al.*, 2008) and family practitioners (Mash *et al.*, 2014). A scoping review of 54 studies conducted by Egbujie *et al.* (2018) on the role of CHWs in T2D self-management, confirmed these findings, and adds that, in some studies, the interprofessional team, which consists of physicians, dieticians and certified diabetes educators, offers comprehensive training.
- The content covered in peer support training programmes generally included developing a diabetes-related knowledge base; developing skills such as communication, problem-solving, facilitation and behaviour change skills, and applying these skills (Ahmadi *et al.*, 2018; Tang & Funnell, 2015; USAID, 2015; Heisler, 2006). Furthermore, interactive teaching methods such as role-play and group-sharing were often included into the training programme (Yin *et al.*, 2015; Tang & Funnell, 2015). A systematic review conducted in the USA by Cherrington *et al.* (2008), on the implementation and effectiveness of the CHW model within diabetes programmes, confirmed these findings and added that other topics covered in studies included teaching technical skills such as monitoring of blood glucose levels and blood pressure monitoring.
- Because behaviour change is so complex, the training should, preferably, be guided by approaches found to be effective in changing behaviour, such as social cognitive theory (Badura, 1997), motivational interviewing (Rollnick *et al.*, 2008) or empowerment theory (Funnell, 2004)]. Hunt *et al.* (2011) conducted a review of 16 studies to identify the theoretical basis of peer support programs in T2D. The authors found that only nine of the 16 studies were based on theories, such as the transtheoretical model of change, the ecological framework or social support model. Lee *et al.* (2017) mention that diabetes outcomes are improved when behavioural and/or psychosocial theories is used in educational programmes. Chapman *et al.* (2015)

conducted a systematic review and meta-analysis of randomised controlled trials in mainland China relating to psychological interventions that were effective in achieving desirable T2D outcomes in China. The authors report that interventions such as cognitive behavioural therapy, motivational interviewing, and client-centred therapy produced favourable outcomes. Similarly, in a randomised controlled trial conducted by Van der Wulp *et al.* (2012) to determine the effectiveness of peer-led self-management coaching of patients with newly diagnosed T2D, the authors imparted the principles of motivational interviewing during the training of peer supporters, to help them support self-efficacy, deal with resistance, display empathy and explore discrepancies. The study revealed improvement in the self-efficacy levels of patients with newly diagnosed T2D

Many peer support programmes are based on the *Chronic Disease Self-Management Programme* of 2008. In a diabetes version of the programme, the diabetes self-management programme, peer supporters aged 35–70 years, mostly with T2D, were recruited from the community. They received four days of training on the *Chronic Disease Self-Management Programme* protocol and they had to prove competence by being evaluated before starting the programme. Paired peer leaders provided weekly 2½ hour sessions to patients with T2D at a community venue for a period of six weeks. Topics covered included diabetes-related information, the significance of self-management, medication, stress management, goal setting and working with the healthcare team. The sessions were very interactive and exchange and sharing of information between patients and peer supporters were important components of the programme (Lorig *et al.*, 2009). However, supervision of peer supporters is just as important as training.

2.4.1.6 Supervision of peer supporters

The basic purpose of supervision is threefold: ensuring adherence to the policies and guidelines of the organisation/programme, enhancing performance by improving knowledge and skills, and addressing issues related to morale, job satisfaction and motivation (Assegaai & Schneider, 2019). Supervision is usually the role of the facility manager, the team leader or other professional nurses, and the degree of supervision is determined by the role and function that the peer supporter assumes.

The extent of supervision affects the degree of effectiveness of peer support programmes (Assegaai & Schneider, 2019). This sentiment is supported widely by literature (Egbujie *et al.*, 2018; Lehmann & Sanders, 2007). Supervision allows the peer supporter to gain experience and to grow in a safe environment. Supervision may improve a peer supporter's sense of belonging, motivation, commitment to, respect for and trust of other stakeholders (Assegaai & Schneider, 2019). Supervision can prevent burnout since it allows monitoring and immediate action when challenges are noticed (Peers for Progress, 2015).

Literature describes various strategies that can be used for supervision, such as meetings to exchange information on challenges and experiences (USAID, 2015; Van der Wulp *et al.*, 2012), teleconferences and emails (Aziz *et al.*, 2018), telephone contact (Peimani *et al.,* 2018), debriefing meetings (Yin *et al.*, 2015), coaching and accompaniment (Schneider *et al.*, 2018), continuous education, and on-the-job training (Peers for Progress, 2015). Having addressed supervision of peer supporters, it is now important to discuss remuneration of peer supporters.

2.4.1.7 Remuneration of peer supporters

Some peer supporter models are volunteer-based and some are paid models (WHO, 2007). Ayala *et al.* (2015) mention that most CHW intervention models related to diabetes care with Latinos in the USA are paid models of peer support, which function within the health system or a community-based organisation. However, paid models of peer support do not always reach at-risk rural communities. In these cases, volunteer models may be an effective addition to paid models of peer support, although the roles of the volunteers have to be clearly defined. An example is provided by a volunteer-based diabetes peer support intervention conducted by Ayala *et al.* (2015) in the United States. The study recruited volunteer peer supporters from a Latino community; the peers had previous diabetes education, did not necessarily have diabetes and were motivated by their volunteer experience. This study involved 34 volunteers – mostly female (97%), married (79%), with high school education (88%), and Mexican-born (82%); three participants had diabetes. The peer supporters were trained to provide support (emotional, appraisal, informational and instrumental) to 5–8 patients through face-to-face individual, group and telephone contact. Eight contacts were planned in the first six months of the

study, but due to challenges related to distances and lack of public transport that were experienced by this volunteer-based intervention, only four contacts, mostly telephonic, were possible. The study emphasises that the type of contact has cost implications and suggests telephone-based contact, especially for rural communities.

Another study, a systematic review conducted in the USA by Cherrington *et al.* (2008), on the implementation and effectiveness of the CHW model within a diabetes programme, synthesised data from eight studies. The study found that all eight studies used the paid model of peer support. In five studies, full-time CHWs worked for the programme; in one study, the CHW worked part-time, and in two studies, the CHWs received a stipend. Telephone support can be a cost-effective extension of face-to-face contact.

2.4.2 Telephone-based contact

Dobson *et al.* (2009) admits that creative inventions are necessary to help individuals with self-management of T2D. Telephones can be used as a tool to disseminate information between the patient and the healthcare provider, to send reminders to accomplish goals, and to provide support, encouragement and guidance between visits (Dale *et al.*, 2009; Krishna & Boren, 2008). Telephone support includes options such as actual telephone calls made by the healthcare provider, and voice messages in the case of no contact. Providing support by telephone saves time, transcends geographical barriers, and offers anonymity, convenience, and privacy (Cherrington *et al.*, 2012; Heisler, 2010). It can also avoid physical challenges faced by elderly and disabled patients (Suksomboon *et al.*, 2014).

However, few health systems have the healthcare providers needed to manage telephone support programmes, and in this case an interactive voice response system could be effective. This automated system can send out messages and reminders to participants regarding healthcare needs according to predetermined schedules. The individual may also have the opportunity to respond to the messages, ask questions or be connected to a healthcare provider by using selected keys on the telephone, if necessary (Heisler, 2010; Tsoli *et al.*, 2018). Clarke *et al.* (2008) agree that this system is ideal in the case of limited staff, and for individuals in need of frequent support and monitoring.

Short message service (SMS) is a newer way of delivering healthcare-related reminders and information via mobile phone. Liew *et al.* (2009) recommend using SMS because of its speed, convenience and cost-effectiveness. A systematic review conducted by Faruque *et al.* (2017) on the effectiveness of SMS in diabetes self-management found that interactive interventions, such as text messaging and web-portals, were particularly effective. Similarly, Dobson *et al.* (2020) found that an interactive automated SMS diabetes self-management programme resulted in significant improvements in glycaemic control in adults with poorly controlled diabetes after two years.

A disadvantage related to telephone calls is the cost implications, as, in some cases, frequent calls are needed to make contact with the patient (Liew *et al.*, 2009). Patients may also be reluctant to share their telephone numbers with individuals from beyond the area (Heisler, 2010). The digital divide is another barrier to telephone contact, since low-income, low-literacy minority groups may not have access to mobile phones (Dobson *et al.*, 2018; Suksomboon *et al.*, 2014). Liew *et al.* (2009) reports that older patients may be more resistant to new technologies, such as mobile phones. In a study to determine the impact of a peer-delivered telephone intervention on diabetes motivation and support, Dale *et al.* (2009) found that, although patients accepted this mode of communication and it led to improvements in HbA1c levels, it was not the preferred mode of communication for the target audience. Furthermore, patients in this study preferred telephone contact by the healthcare provider, instead of the peer supporter. Web or internet-based contact could, however, be an alternative and/or supplementary method of support to face-to-face interventions.

2.4.3 Web or internet-based contact

Web or internet technology has the ability to bring together support, information and education beyond the care centre, at a low cost (Moorhead *et al.*, 2013). Huber *et al.* (2018) mention that online support groups are often valuable after someone has been diagnosed with a devastating illness, such as cancer. The profile of internet users appears to be people who are younger, better educated, with a higher income and self-directed. The researcher acknowledges that this profile does not fit the patient with T2D, especially in LMICs. Benefits of this type of contact include

accessibility, availability, convenience, anonymity and the possibility of transcending geographical restraints (Faruque *et al.*, 2017; Van Uden-Kraan *et al.*, 2011). Weaknesses include that it is only available to those who have access to the internet (Bartlett & Coulson, 2011), and it is a highly unregulated mechanism with variable degrees of quality and consistency (Moorhead *et al.*, 2013). Other weaknesses that have been reported are lack of friendliness between members due to weak ties and possible misinterpretation of non-verbal communication (Bartlett & Coulson, 2011).

After the extensive discussion of the modes of delivery of peer support, a discussion of models of peer support will follow.

2.5 MODELS OF PEER SUPPORT

Peer support can be led by the healthcare professional, the expert patient and/ or the CHW. The researcher will discuss the professional-led peer support model first.

2.5.1 Professional-led peer support model

According to the professional-led peer support model, one or more members of an interprofessional team, such as nurses or physicians, organise peer support groups for individuals with the same chronic disease. A professional member usually facilitates the activities of the group, though the individuals determine the programme. The programme may also include a component involving a trained peer supporter, usually assisted by an expert patient. An expert patient is an individual who is living with the chronic disease themselves (Heisler, 2010).

The advantage of the model is that the facilitator is a healthcare professional, with formal knowledge, skills and experience of the condition. The healthcare professional has access to various other experts, such as dieticians and endocrinologists, who can share information and experience. The reality is, however, that, due to the increase in the number of patients with diabetes, there is a global shortage of healthcare professionals who can provide ongoing support to patients with diabetes (Baksi *et al.*, 2008; Heisler, 2006). Often, health systems simply do not have the resources, such as time, space and staff, for professional-led programmes. These programmes may bring with them other challenges, such as adapting health information to the cultural, linguistic and literacy levels of patients (Heisler, 2006).

Literature on professional-led peer support programmes have focused on comparing trained diabetic peer supporters and healthcare professionals regarding the delivery of patient education. A systematic review by Gatlin *et al.* (2017) found no evidence that healthcare professionals were more effective at delivering patient education than trained diabetic peer supporters. This finding was confirmed by other studies, such as that of Baksi *et al.* (2008), who compared trained diabetic patients and healthcare professionals regarding the delivery of patient education. The study showed that diabetic patients were as effective at conveying information as healthcare professionals. Similarly, Heisler *et al.* (2010) compared diabetes peer support with nurse care management. After six months, participants in the diabetes peer support intervention had better HbA1c levels, insulin initiation, and diabetes-specific support than patients exposed to usual nurse care management. It is, therefore, clear from an evidence-based perspective that support provided by peer supporters is just as effective as support provided by healthcare professionals. The results of a meta-analysis of randomised controlled trials conducted by Zhang *et al.* (2016) on how to optimise the effect of peer support on adults with T2D also found that peer support provided by expert patients and CHWs may have significantly better effect. The model for using expert patients for peer support will be discussed next.

2.5.2 Expert patient peer support model

In this model, individuals living with the chronic disease themselves are peer supporters (Heisler, 2010). They are positive role models and serve as mentors and coaches in the community, because they are able to share their personal experiences.

Expert patients are expected to complete intensive peer support training and testing before acceptance into the programme (Heisler, 2010; Baksi *et al.*, 2008). The literature also refers to patient-led models as peer-led models (Dale *et al.*, 2009; Lorig *et al.*, 2009), peer coaches (Van der Wulp *et al.*, 2012); peer mentors (Long *et al.*, 2012), peer supporters (Yin *et al.*, 2015), peer educators (Thom *et al.*, 2013), peer leaders (Davis *et al.*, 2016), peer advisors (Baksi *et al.*, 2008), natural leaders (Philis-Tsimikas *et al.*, 2011) and lay-led (Griffiths *et al.*, 2007).

There is extensive literature that supports the use of expert patients to provide peer support (Aziz *et al.*, 2018; Davis *et al.*, 2016; Zhang *et al.*, 2016; Thom *et al.*, 2013; Van der Wulp *et al.*, 2012). However, other studies that used expert patients report no changes after the intervention (Cade *et al.*, 2009; Dale *et al.*, 2009). Having briefly described the expert patient model, the CHW model will be discussed next.

2.5.3 Community health worker-led peer support model

In this model, the CHW leads peer support. CHWs are known by various names that are unique to the context in which they work, including CHWs, *promotores de salud* (Fisher *et al.*, 2012), community health advisors (Hunt *et al.*, 2011), home-based carers, lay health workers (Lewin *et al.*, 2005), natural leaders (Philis-Tsimikas *et al.*, 2011) and lay treatment counsellors (Trafford *et al.*, 2018).

In the South African context, the Ward-Based Primary Healthcare Community Outreach Team (WBPHCOT) Policy Document refers to CHWs as individuals who are selected and trained and work in the community where they live. CHWs are the first line of support between the community and many health and social departments. They empower community members to make informed decisions about health and psychosocial issues and provide continuous support and care to individuals who are vulnerable, based on illness and poor living conditions (Department of Health, S.A., 2018). Likewise, for the United States Labour Department, CHWs constitute a group of workers that helps individuals embrace a healthy lifestyle while conducting outreach and advocacy (Perry *et al.*, 2014).

CHWs do not always have T2D, but they are peer supporters for the community they serve, because they have similar characteristics. They speak the same language and understand the socio-cultural and economic norms of the patients with whom they work. Consequently, CHWs are in a unique position to be accepted and trusted by the community. CHWs can bridge the gap between the community and the healthcare services, because of this special connection with the community. (Kok *et al.*, 2017; Merius & Rohan, 2017; Shah *et al.*, 2013; Cherrington *et al.*, 2008). CHWs can play a vital role in improving the quality of life of patients with T2D (Hunt *et al.*, 2011). The CHW is not a new concept, and has a long global history.

2.5.3.1 Global integration of CHWs

The first CHWs date back to 1920, in China, where illiterate community members were trained to keep records of births and deaths, doing vaccinations, giving health talks and providing basic healthcare (Perry *et al.*, 2014). In 1950, programmes such as the Chinese Barefoot Doctor Programme, which used health assistants, followed and expanded, to the extent that, by 1972, one million ”*barefoot doctors”* were serving a rural Chinese population of 800 million people (Crigler *et al.*, 2014; Perry *et al.*, 2014; Lehmann & Sanders, 2007).

This model received global attention, since the trained physician model could not address the growing health needs of poor and rural populations. At the Declaration of Alma Ata in 1978, the vision of *Health Care for All by the Year 2000* acknowledged the inclusion of CHWs in primary healthcare to achieve this vision (WHO, 1978; Van Ginneken *et al.*, 2010). This strategy aimed to relieve the shortage of human resources for health in various LMICs that were characterised by limited resources (WHO, 2007). The strategy elicited global support and the implementation of CHW programmes in many countries, such as Indonesia, Brazil, Ghana, Nepal and Niger (Perry *et al.*, 2014; Schneider, 2008; WHO, 2007).

In the 1980s, many large-scale CHW programmes experienced difficulties caused by unrealistic expectations, poor planning, inadequate resources, poor management, problems of sustainability, and difficulty maintaining quality (Perry *et al.*, 2014; Perry & Zullinger, 2012). Additionally, an economic recession occurred, and the economies of developing countries, especially, decreased funding of the programmes. This led to the collapse of many CHW programmes, leaving only non-governmental organisations (NGOs) and faith-based organisations participating in community-based healthcare. In spite of the challenges faced by CHW programmes, strong CHW programmes emerged in Brazil, Nepal and Bangladesh. These strong CHW programmes made a noticeable contribution to a rapid decrease in these countries’ mortality rate of children under five years of age (Crigler *et al.*, 2014; Perry *et al.*, 2014).

CHWs resurfaced globally in 2008, due to the chronic shortage of more than four million trained healthcare professionals. The WHO advocated shifting specific tasks to health workers with less training and fewer qualifications, in order to relieve

overstretched health systems (Perry & Zullinger, 2012; WHO, 2008). CHWs have had a longstanding positive impact on mobilising communities for child immunisation campaigns, providing education on HIV/AIDS and sexually transmitted diseases, supporting tuberculosis clients and tracing defaulters in the community, supporting clients on antiretroviral treatment (ART), and supporting clients in need of home-based care (Daviaud *et al.*, 2018; Languza *et al.*, 2011). There is also a growing body of evidence supporting the role of CHWs in diabetes care (Egbujie *et al.*, 2018; Zhang *et al.*, 2016; Ayala *et al.*, 2015; Perry *et al.*, 2014). Many CHW programmes have since been developed abroad, such as the Diabetes Sister Programme in the USA, which provides education and support to diabetic women. Another is the community-based peer support programme in Anhu, China, which provides group support to help diabetics (Peers for Progress, 2014). Large organisations, such as the Robert Wood Johnson Foundation, the ADA Educators, the American Public Health Association and Centers for Disease Control and Prevention, recognise and support CHW models, despite lack of consensus on the scope of work of CHWs (Cherrington *et al.*, 2008). A discussion of the integration of CHWs in South Africa will follow.

2.5.3.2 Integration of community health workers in South Africa

South Africa has a long history of CHW programmes, which were initiated by individuals, NGOs and faith-based organisations in the health system, to correct inequalities in healthcare services in the apartheid era. Since 1994, the South African health system has focused on the primary healthcare approach that is run mainly by nurses and doctors. CHWs are not included in the approach and most CHW programmes collapsed as funders withdrew their support (Van Pletzen *et al.*, 2014; Van Ginneken *et al.*, 2010).

In the late 1990s, CHW support resurfaced in response to the parallel HIV/AIDS and tuberculosis epidemics. In response to generous funding, large-scale use of CHWs commenced; they were employed by NGOs in disease-focused programmes, such as those targeting tuberculosis and HIV/AIDS (Languza *et al.*, 2011; Schneider, 2008). CHWs play an important role in a variety of care, treatment and support activities, such as home-based care, HIV testing and counselling, tracing tuberculosis defaulters at community level and caring for vulnerable children

(Schneider, 2018; Schneider *et al.*, 2018). CHWs were later also included in other programmes, such as those for the prevention of mother-to-child transmission of HIV, and providing universal access to ART. The Department of Health describes CHWs as an indispensable extension of the reach and professional involvement in ART services (Schneider, 2008). Another reason for the renewal of support for CHWs was the chronic shortage of trained healthcare professionals (WHO, 2008) and the continuing migration of healthcare professionals (Clarke *et al.*, 2008). At that stage, CHWs had various titles, degrees of training (Schneider *et al.*, 2018), levels of remuneration and hours of work (Daviaud *et al.*, 2018).

In 2004, the Department of Health released a South African CHW policy framework that set out the plan for a future national CHW programme (Department of Health, S.A., 2004). The document states that all CHWs fall under the Expanded Public Works Programme, which is a poverty alleviation strategy of the government (Schneider, 2008; Lehmann & Sanders, 2007). Key features of the framework included the following:

- CHWs would not be government employees;
- CHWs would be employed by NGOs that were contracted by the government to render community-based service. The NGOs would be responsible for training, orientation and supervision;
- Fully trained CHWs would receive a stipend of R1 000 per month;
- CHWs would be trained through appropriate learnership structures, since the Expanded Public Works Programme is linked to the National Skills Development Plan; and
- CHWs would be residents of the community and be selected by communities (Friedman, 2005; Department of Health, S.A., 2004).

This large and heterogeneous cadre of workers was, thus, officially introduced as CHWs; they included all previous lay and community workers, such as community care workers, ancillary health workers, lay health workers, home-based carers, lay counsellors, home and community-based workers and/ or direct observation treatment supporters (Trafford *et al.*, 2018; Schneider, 2008). In 2011, an estimated 70 000 CHWs had been contracted by 3 000 NGOs and were working in South Africa (Schneider *et al.*, 2018).

The South African government launched a model for re-engineering primary healthcare in 2011, to assist with achieving the Millennium Development Goals. The model proposed using WBPHCOTs, which consisted of six generalist CHWs, a health promotion officer; an environmental health officer and an outreach team leader, which was a nurse linked to a healthcare facility (Department of Health, S.A., 2010) The main task of this team was to do individual, family and community assessment, health promotion, prevention, early detection and referral within their demarcated areas. The estimated coverage per CHW was 150–250 households in the community (Department of Health, S.A., 2018; Van Pletzen *et al.*, 2014). The re-engineering of public healthcare, thus, formalised the role of the CHW.

As in other parts of the world, CHWs are recognised as a crucial part of the workforce of the health system; however, there are still major problems related to the integration of CHWs into the health system of South Africa (Assegaai & Schneider, 2019). Various issues related to the poor integration of CHWs in the South African health system will be described next, starting with lack of government support.

a) Lack of government support

Formal policies, guidelines and procedures that regulate imperative components related to CHWs are lacking (Trafford *et al.*, 2018; Schneider *et al.*, 2018; USAID, 2015). South Africa's Department of Health recently released the WBPHCOT Policy Framework and Strategy, which was supposed to provide structure for the scope of work, selection, training, supervision and support for CHWs, linkages between CHWs and health systems, remuneration and funding of CHWs and monitoring and evaluation of CHWs (Department of Health, S.A., 2018). However, a lack of political commitment and clear leadership has been reported (Schneider *et al.*, 2018), even in this recent policy framework document (Department of Health, S.A., 2018). The next issue relates to the inadequate training of CHWs.

b) Inadequate training of community health workers

Currently, there is no standardised training curriculum for CHWs in South Africa, which means training is customised for the needs of provinces, individual programmes or specific mandates (Schneider *et al.*, 2018; Puoane *et al.*, 2017; Languza *et al.*, 2011). This leads to inconsistency in the degree and quality of

training (Van Ginneken *et al.*, 2010). Schneider *et al.* (2018) concurs that training of CHWs remains random, with weak alignment. Provinces have resorted to decentralised in-house training at district and sub-district levels (Schneider *et al.*, 2018; Department of Health, S.A., 2018). A study that evaluated WBPHCOTs at National Health Insurance pilot sites in seven provinces found that the training programmes were poorly planned (Jinabhai *et al.*, 2015). The methods of training did not consider the capacity, knowledge and skills of the CHWs and the programmes were not aligned well with the competencies required. The organisation and timing of training was inadequate and there was a shortage of learning material and space (Jinabhai *et al.*, 2015; Schneider *et al.*, 2018). A respondent in the study stated, *"I think the training was not good for them [CHWs] because they can't even express themselves and some of them they don't know what a ward base outreach team is"* (Jinabhai *et al.*, 2015:29).

Many programmes continue to provide inadequate training of poor quality that produces CHWs who lack knowledge (USAID, 2015) and who may disseminate incorrect information to patients (Tsolekile *et al.*, 2014). A recent study evaluating NCD-related roles, training, and diabetes and hypertension knowledge of CHWs, found that there was inconsistencies in training, which could lead to different standards of care (Puoane *et al.*, 2017). Good leadership and supervision are desirable characteristics in a CHW programme.

c) Lack of supervision and support of community health workers

Inadequate supervision has been a constant challenge for CHWs (Schneider *et al.*, 2018). CHWs generally complain of a lack of support and supervision, which impacts on their performance. Facilities are commonly so under-resourced that suitable supervision of CHWs is not possible (USAID, 2015) and, in some areas, there are no supervisors at all (Schneider *et al.*, 2018). Assegaai and Schneider (2019) report that CHWs with inadequate skills often find themselves in remote places without the necessary moral support and supervision. Assegaai and Schneider (2019) allude to the absence of a guideline for supervision and support of CHWs, which causes these functions to be neglected.

Peer supervisors need training in order to execute their role effectively. Due to staff shortages, supervisors often have conflicting responsibilities (Schneider *et al.*, 2018; Austin-Evelyn *et al.*, 2017) and the role of the supervisor may become a burden (Assegaai & Schneider, 2019; Jinabhai *et al.*, 2015). However, dual roles by supervisors must be prevented, so that accompaniment of the peer supporter(s) in the community can occur and strengthen competency. Peer supervisors often have inadequate resources, such as transport and/or time, which makes supervision activities difficult (Austin-Evelyn *et al.*, 2017). White *et al.* (2017) report that supervisors should not hold dual responsibilities and should, ideally, be dedicated to the training, supervision and evaluation of CHW programme only. This is generally not the case in South Africa.

USAID (2015) reports that CHWs are expected to achieve unrealistic targets. CHWs are overburdened and have a high workload due to staff shortages (Seutloali *et al.*, 2018; USAID, 2015). High workload, combined with minimal to no support, could lead to inadequate patient care. Due to their many responsibilities, CHWs may lose sight of the identified priorities.

Schneider (2008) alludes to the existence of a precarious relationship between CHWs, other healthcare professionals and the primary health system. A CHW stated in an interview, *"Most of the nurses look down on us. We work as slaves at the clinic, but our work is not recognised"* (Jinabhai *et al.*, 2015:58). Poorly defined roles, their informal appointment, and the responsibilities of CHWs can create tension and even power struggles between healthcare professionals and CHWs (USAID, 2015; Van Ginneken *et al.*, 2010). Other factors that could contribute to this situation include blurred lines of authority and accountability and dual-tasking (Department of Health, S.A., 2018; Jinabhai *et al.*, 2015). Ironically, supervision is often the link between the CHW, healthcare professionals and the primary health system (Shelley *et al.*, 2016). The next issue that will be addressed is remuneration.

d) Low remuneration

In the South African context, CHWs are *"neither workers nor volunteers*" (Department of Health, S.A., 2018:14). The justification for this statement is that, because they received a stipend, the labour of CHWs was acknowledged – they

received compensation for their work. CHWs are not acknowledged as government employees and, therefore, do not have the rights and privileges that accompany such employment.

CHWs commonly have employment contracts of short duration that are extended or terminated randomly. CHWs are rewarded with a small stipend that is generally sporadic in nature (Trafford *et al.*, 2018). Levels of remuneration and hours of work are not standardised and vary between provinces (Daviaud *et al.*, 2018) and from organisation to organisation (Department of Health, S.A., 2018). "*Stipends may range from R1,700 a month for a 40 hours week in the Kwazulu-Natal province, to R2,500 a month for 30 hours a week in Gauteng province, to R3,500 a month for 18 hours a week in the Nelson Mandela Metro in the Eastern Cape province"* (Daviaud *et al.*, 2018:11). The most recent policy document, the WBPHCOT Policy Framework, is silent on the issue of remuneration and working conditions of CHWs (Schneider *et al.*, 2018). Despite poor or no compensation, CHWs continue working, and this adversely affects their motivation (USAID, 2015). A respondent in a study that evaluated the WBOT model at National Health Insurance pilot sites in seven provinces states, "*CHWs perform very badly if they don't receive their stipend for long as it creates a big stress to them… It is so hard to work with people who are hungry"* (Jinabhai *et al.*, 2015:27).

Many CHWs are paid directly by the government (Mottiar & Lodge, 2018; Nxumalo *et al.*, 2016) while other CHWs are officially employed, paid and contracted to render healthcare services by local or international NGOs. CHWs are also exposed to various other risks.

e) Occupational hazards

CHWs are exposed to various health risks while executing their duties on a daily basis. This is currently the case in the Covid-19 pandemic, where CHW testing teams are at the forefront of tracking and tracing potential Covid-19 cases (City Press, 2020). CHWs often also work in areas where criminality and violence are rife, and no provision is made for their protection in this regard. A lack of equipment, such as gloves and facemasks, was also identified as a barrier to their work (Nyalunga *et al.*, 2019; Seutloali *et al.*, 2018; Schneider *et al.*, 2018; USAID, 2015). A large

coverage area with limited transport is another concern for CHWs (Nyalunga *et al.*, 2019; Schneider *et al.*, 2018; Austin-Evelyn *et al.*, 2017; USAID, 2015).

f) Readiness of community health workers to fulfil their role

The majority of CHWs in South Africa were programme-focused or single-purposed, for example, they were prevention of mother-to-child transmission counsellors, direct observation treatment supporters for tuberculosis, or provided HIV and AIDS (ART) and malaria care, treatment and support (Van Ginneken *et al.*, 2010; Schneider, 2008). However, this is not necessarily the case in all South Africa's provinces. CHWs would be expected to function as generalist CHWs, who provide the community with a wide variety of services, including HIV/AIDS, tuberculosis or child and maternal care support, or help to manage NCDs (Puoane *et al.*, 2017; Schneider *et al.*, 2018). CHWs may not be ready to step into their role as generalist healthcare worker, as required by the public healthcare re-engineering model.

A general lack of knowledge, skills, literacy levels and abilities in current CHWs could possibly be ascribed to entry requirements for programmes in the past (Schneider *et al.*, 2018). A review conducted by USAID (2015), on factors impacting the effectiveness of CHW behaviour change, found that CHWs were often unable to execute their roles safely and effectively, due to a lack of knowledge. Egbujie *et al.* (2018) mention that, although preparing CHWs for their roles is acknowledged as fundamental, it is commonly neglected in programme design. The role of CHWs has been expanded and they, therefore, need orientation and training with regard to the new responsibilities – both existing CHWs and new CHWs (USAID, 2015).

CHWs are increasingly placed in the healthcare facility itself (Schneider *et al.*, 2018), where they assist healthcare professionals to provide health education and HIV counselling. The problem, however, is that some CHWs are even monitoring the vital signs of clients without supervision. This is a concern, as CHWs may not have the necessary knowledge and skills to perform and interpret the vital signs and act accordingly (Languza *et al.*, 2011). A study conducted by Puoane *et al.* (2017), to describe a training process to equip CHWs with knowledge and skills to identify individuals at risk of cardiovascular disease, found that, although CHWs were working with NCDs, their knowledge of NCDs was limited. The study also found that

CHWs could be trained, and that continuous training was necessary. Therefore, it becomes clear that, to ensure good practice, it is fundamental that adequate training, supervision and frequent assessment of activities is incorporated (Tsolekile *et al.*, 2014). These issues may compromise the quality and effectiveness of services rendered by the CHWs and, subsequently, the effectiveness of peer support and diabetes self-management.

2.6 SUMMARY

This chapter provided a comprehensive overview of T2D in terms of its prevalence, diagnostic criteria, impact, global response, South African response, medical management and self-management. The researcher explained the relevance of peer support in the self-management of T2D. The first model of peer support, face-to-face peer support, was discussed with specific reference to individual-based contact and group-based contact, and the recruitment, selection, training, supervision and remuneration of peer supporters. The discussion was followed by information on two other modes of contact, namely, telephone and web or internet-based contact. The discussion then turned to models of peer support, namely, professional-led, expert-patient-led and the CHW model. The integration of CHWs globally and in the South African text was described, and related challenges, such as lack of government support, inadequate training of CHWs, lack of supervision and support of CHWs, low remuneration, occupational hazards and readiness of CHWs to fulfil their role. The next chapter will present the first article, which address the first research objective of the study.

CHAPTER 3
A FACE-TO-FACE PEER SUPPORT MODEL FOR ADULTS WITH TYPE 2 DIABETES: A SYSTEMATIC REVIEW

3.1 INTRODUCTION

This chapter presents a manuscript on a face-to-face peer support model for adults with Type 2 diabetes: A systematic review.

3.2 MANUSCRIPT DETAILS

Title	A face-to-face peer support model for adults with Type 2 diabetes: A systematic review
Authors	Melanie Pienaar and Marianne Reid
Journal	*BMC Public Health*
Journal details	Open access Peer-reviewed journal Listed as an accredited journal by the Department of Higher Education and Training (South Africa) Impact factor 2.690 (2020-21 Journal metrics)
Status	Under review

3.3 ASSOCIATED ADDENDA

- Link to author guidelines (Addendum B)
- Approval from Health Sciences Research Ethics Committee (Addendum C)
- Highest qualifications of experts in the systematic review (Addendum D)
- Critical appraisal tool references (Addendum E)
- The characteristics of included papers (Addendum F)

A FACE-TO-FACE PEER SUPPORT MODEL FOR ADULTS WITH TYPE 2 DIABETES: A SYSTEMATIC REVIEW

Corresponding Author: Melanie Pienaar

Institutional address: University of Free State, 205 Nelson Mandela Drive, Park West, Bloemfontein, 9301, South Africa

E-mail: pienaarma@ufs.ac.za

Author: Dr Marianne Reid

Institutional address: University of Free State, 205 Nelson Mandela Drive, Park West, Bloemfontein, 9301, South Africa

E-mail: reidm@ufs.ac.za

Abstract

Background: Peer support has been recognised as a promising strategy to improve self-management in patients living with chronic conditions, such as Type 2 diabetes (T2D). The purpose of the review was to synthesise the best available evidence on face-to-face peer support models for adults with T2D in low and middle-income (LMIC) countries.

Methods: We searched Medline, Cumulative Index to Nursing and Allied Health, Literature Academic Search Ultimate, PsycINFO, CAB Abstracts, Health Source: Nursing/Academic Edition, SPORTDiscus, Africa-Wide Information, MasterFILE Premier, SocINDEX, ERIC, PsycARTICLES, Open Dissertations, Communication & Mass Media Complete, Health Source-Consumer Edition and Google Scholar for the period January 2000 to December 2017. Reference list checking and contact with authors were additional sources of data. Screening of papers, critical appraisal and data extraction were carried out independently by at least two reviewers.

Results: From 3 092 abstracts retrieved from database searches, data was extracted from 12 papers. There was no consistency in design, setting, outcomes or measurement instruments amongst the papers. All 12 papers reported positive self-management health outcomes. Diabetic patients and community health workers (CHWs) were identified as two common face-to-face peer support models. The recruitment and selection of diabetic patients as peer supporters focused on patients from the community, with good glycaemic control and/or leadership skills, who were recommended by healthcare professionals. Recruitment of CHWs as peer supporters was done from an existing infrastructure of CHWs in the community and, thus, selection criteria were poorly described. The training of peer supporters featured as an important component, highlighting who provided training and the

duration and content covered in training. Motivational interviewing was the most common theory basis for training used in the peer support interventions. Face-to-face, group and/or individual-based peer support was often supplemented by other peer support methods. The supervision of peer supporters was generally poorly described.

Conclusions: Face-to-face peer support could be used as a self-management strategy for patients with T2D in LMICs, however, there are many grey areas related to this strategy that need to be explored further.

PROSPERO trial registry number, CRD 41018103161

Keywords: Type 2 diabetes, face-to-face, peer support, self-management, low and middle-income countries

Background

Diabetes is causing a global health crisis. Since 2000, the global prevalence of diabetes types 1 and 2 combined has increased exponentially, from 151 million to 463 million. Approximately half a billion people are presently living with diabetes and 80% of the diabetes burden is carried by low and middle-income countries (LMICs) [1]. In this complex chronic disease, the patient is responsible for more than 95% of the management of diabetes [2-4]. Self-management by people with type 2 diabetes (T2D) implies following a healthy diet, incorporating physical exercise into the daily routine, using medication correctly, monitoring blood glucose levels, recognising and responding to warning signs, and making the right decisions regarding healthcare [4-6]. These requirements can present a daunting situation for the patient, especially if the patient lacks knowledge, resources and social support. Many patients cannot manage their condition without continuous support. In this respect, peer support has been identified as a promising strategy to improve diabetes self-management [7-9].

Peer support can be described as support from an individual who shares similar characteristics or experiences as the patient [10-12]. The uniqueness of peer support is that peer supporters, as defined above, may understand the languages, cultures and circumstances of the patients they serve, thereby creating an immediate connection with patients, and making it easier to share challenges and experiences with an insider. Peers for Progress, a global evidence-based initiative, identified the following functions of peer support: assistance in daily care, social and emotional support, linkage to care and ongoing support [13]. Different peer support models for T2D have been suggested in literature,

which also suggests modes of delivering these models [3,13]. Figure 1 provides an illustration of these models and their modes of delivery.

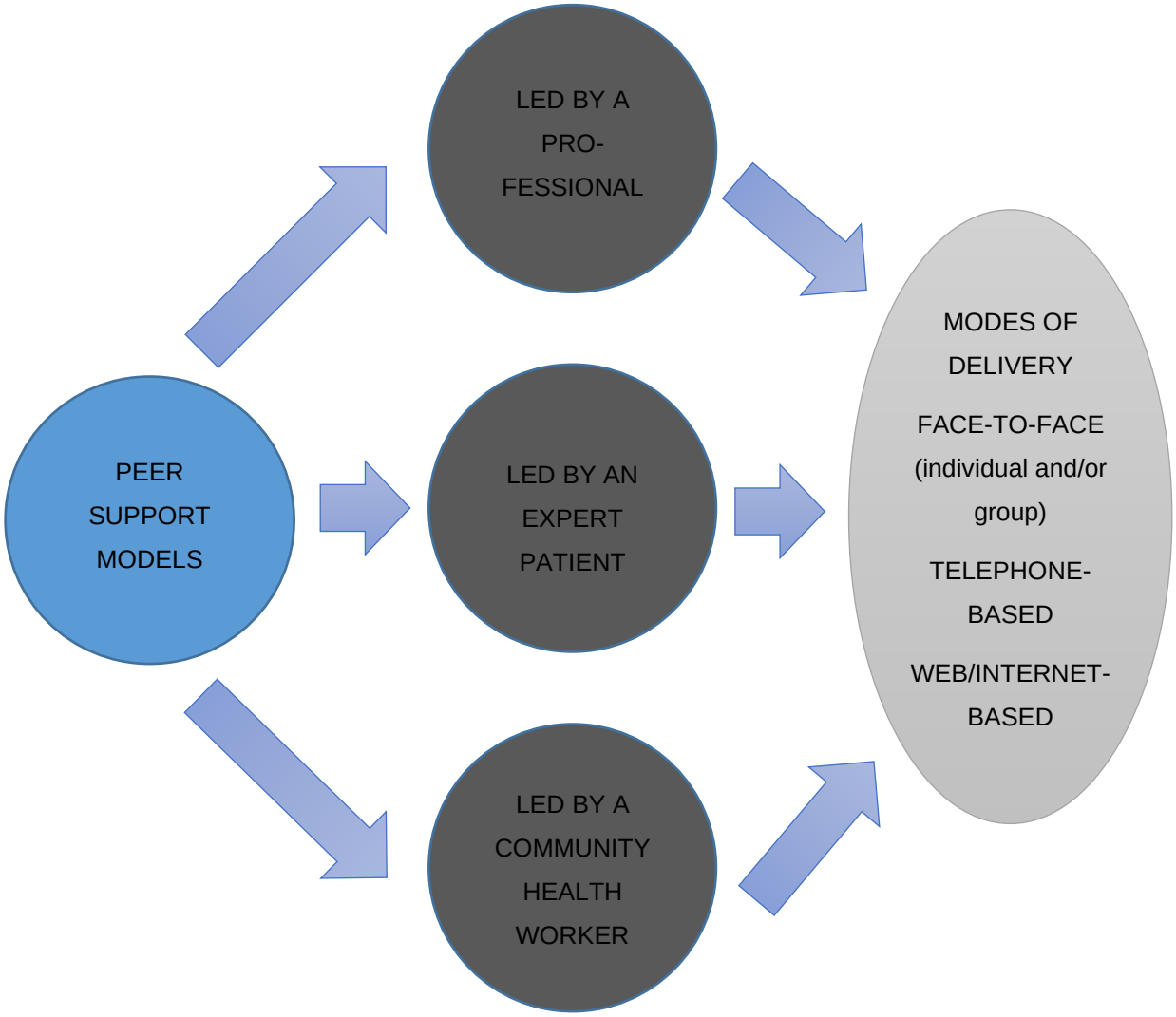

Figure 1: Models of peer support and modes of delivery (adapted from [8])

Several systematic reviews have demonstrated the impact of peer support on diabetes and self-management outcomes, such as on glycosylated haemoglobin (HbA1c), body mass index, self-efficacy, physical activity and blood pressure [14-19]. However, this systematic review is the first, as far as the authors could determine, that synthesised the best available evidence on any face-to-face – either group or individual-based – peer support models for adults with T2D in LMICs. Inclusion of the papers was guided by the World Bank's

classification criteria for LMICs, which define low-income economies as those having a gross national income (GNI) of 1 025 USD or less; lower-middle-income economies as those with a GNI between 1 026 and 3 995 USD, and upper-middle-income economies as having a GNI between 3 996 and 12 375 USD [20]. These countries may have limited access to resources, trained specialists, infrastructure and technology [21].

Theoretical grounding

The theoretical grounding of the study was provided by the integrative model of behaviour prediction (IMBP) [22]. The IMBP is an extension of the theory of reasoned action and the theory of planned behaviour [23]. The IMBP "extends the scope of the normative determinant and points attention to skills and environmental barriers as moderators of the intention–behaviour relationship" [22]. The IMBP suggests that an individual will perform the intended behaviour if the necessary knowledge and skills are present and if contextual factors allow the behaviour to be performed. However, if the individual does not carry out the behaviour, it is generally due to lack of knowledge and skills and/or contextual factors, and not due to lack of motivation. Background factors, such as demographics, culture, socio-economic situation, exposure to media and individual factors such as personality and personal experience are sources of belief. These beliefs may influence attitude towards behaviour, perceived norms and self-efficacy and eventually intention to perform behaviour [24]. In this study, a systematic review was performed, as face-to-face peer support could serve as a strategy to develop self-management knowledge and skills and minimise contextual constraints. Figure 2 provides an illustration of the IMBP.

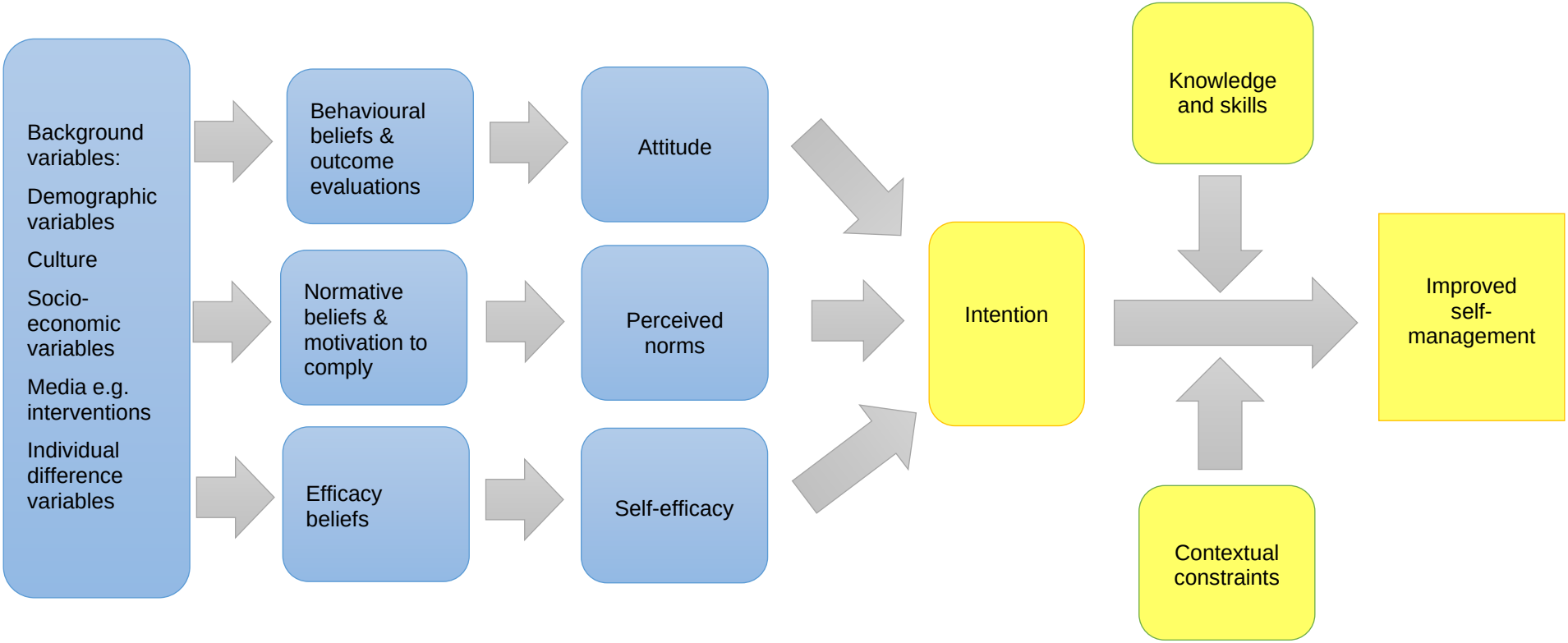

Figure 2: Integrated model of behaviour prediction (adapted from [24])

This study's specific focus on face-to-face peer support models was informed by a study on the development of a health dialogue model for patients with diabetes in LMICs [25]. Furthermore, this systematic review will be used to inform the pilot of a developed face-to-face peer support model developed within a complex intervention in a LMIC. The specific review question of the study was: *Which face-to-face peer support model is identified as a self-management strategy for patients with T2D in LMICs?*

Methods

This study is registered with PROSPERO, trial registry Number CRD 41018103161, and was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [26].

Data sources and searches

A librarian experienced in systematic reviews assisted with the search strategy. The following electronic databases were searched: Medline, Cumulative Index to Nursing and Allied Health, Literature Academic Search Ultimate, PsycINFO, CAB Abstracts, Health Source: Nursing/Academic Edition, SPORTDiscus, Africa-Wide Information, MasterFILE Premier, SocINDEX, ERIC, PsycARTICLES, OpenDissertations, Communication & Mass Media Complete, Health Source-Consumer Edition and Google Scholar based on these databases' accessibility and comprehensiveness. The data searches were conducted from 1 January 2000 to 30 December 2017, a period where diabetes prevalence had escalated. Additionally, the reference lists of studies included were reviewed for relevance, and authors of studies were contacted if additional information was required. The search terms used in the electronic search strategy are provided in Table 1.

Table 1: Search terms used in the electronic search

Variables	Search words
Population: Adults patients with T2DM	("diabetes mellitus*" or "type 2 diabet*" or "type 2 diabet*" or diabetic or niddm or "non-insulin dependent diabet*" or iddm or "insulin dependent diabet*" or t2d or "t2 dm")
Intervention: Peer support intervention	("lay worker*" or "lay health worker*" or volunteer* or coach* or "patient* navigator*" or "community health worker*" or "health advisor*" or promotora* or "outreach worker*" or "health representative*" or "lay health educator*" or peer*) and (interven* or educat* or counsel* or support*)
Comparison: Standard care	usual care
Outcome: Improved self-management	("self manag*" or "health behav*" or hba1c or weight* or "blood pressure" or "health litera*" or "self-care*" or "self caring" or "self effic*")

Study selection

Two independent reviewers (MP and MR) screened the titles and abstracts of potential papers against the following *inclusion criteria*: papers in English, or in other languages with an English abstract; papers reporting on studies that had been conducted in LMICs; papers of studies involving adults (age ≥18) diagnosed with T2D by physicians; and papers reporting group or individual face-to-face peer support. All study designs were included. *Papers were excluded* if participants were <18 years of age; if papers were in languages other than English and had no English abstract; and if papers reflected studies that were conducted in high-income countries. Furthermore, papers of peer support interventions led by professional healthcare workers, as well as telephone, web and internet-based peer support interventions as primary mode of delivery, were excluded. Papers in the form of editorials,

research briefs and conference reports were also excluded. Two independent reviewers (MP and MR) assessed the full texts of potential papers that were managed in Mendeley, an online reference manager.

Data extraction and quality assessment

One reviewer (MP) extracted data from the potential papers using a standardised data extraction form. The information that was captured included bibliographic details and context, methodology, intervention and outcomes, study findings and quality assessment rating. A second reviewer (MR) then verified the accuracy of the data. Four reviewers (MP, MR, EJvR and CS) carried out quality assessment of the potential studies. The following tools were used to assess the risk of bias of the papers according to their study design: Critical Appraisal Skills Programme (CASP) randomised controlled trial tool [27], CASP review tool [28], and the Johanna Biggs Institute appraisal checklist for quasi-experimental papers [29]. Although the scores differed according to the research design used, the tools focused on the following aspects related to methodological quality: a focused area, process of recruitment, data collection methods, what were the results and whether the results could be applied to the local population. The quality assessment revealed good, moderate and poor quality papers, with a good quality paper indicating low risk of bias. When discrepancies arose amongst reviewers, consensus was reached through discussion.

Data synthesis and analysis

The purpose of the review was to synthesise the best available evidence on face-to-face peer support models for adults with T2D in LMICs. Due to the heterogeneity of the studies in terms of design, setting, outcomes and measurement instruments, a meta-analysis was not possible, and a narrative synthesis was performed instead.

Results

The electronic search strategy identified 3 092 papers. After duplicate papers had been removed, and screening against titles and abstracts and full-text assessment of papers had been completed, 12 papers were included in the synthesis. Figure 3 illustrates the selection process, which followed the PRISMA guidelines [26].

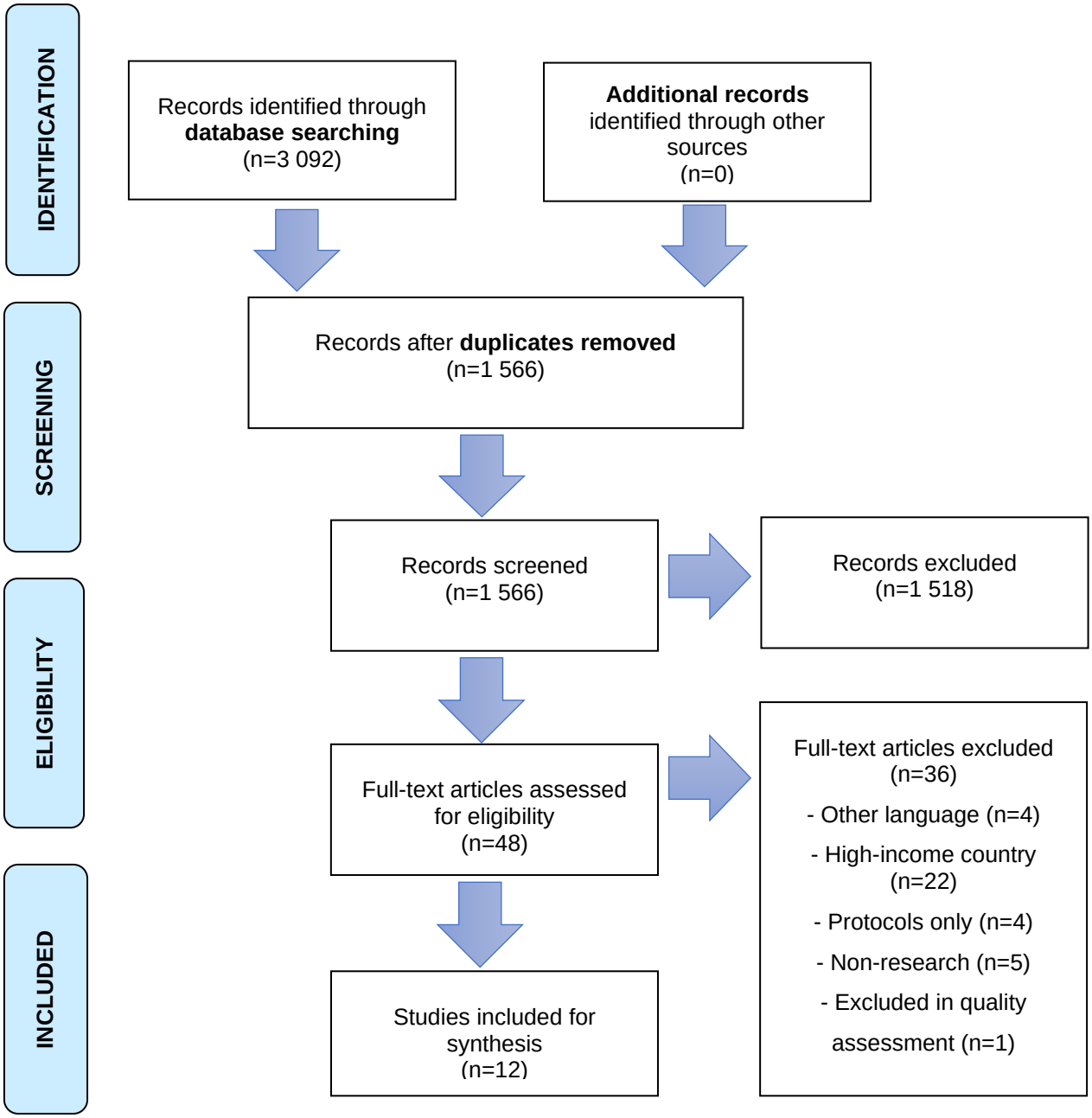

Fig. 3: Selection process according to the PRISMA guidelines

Characteristics of papers included

The papers included in the systematic review were six randomised controlled trials, one cohort study, two non-randomised trials, two single group, pre-post-test study and one systematic review. The participants of the various studies were adults with T2D from various LMICs, such as Iran [30], India [31,32], the Philippines [33], Mali [34], Malaysia [35], South Africa [36], Jamaica [37], Brazil [38], Guatemala [39], Cameroon [40] and a few other countries classified by the World Bank as LMICs [41]. The characteristics of the papers that were included are given as Addendum F. The two models of peer support that were identified in the systematic review and the subsequent emerging themes – recruitment, selection and training of peer supporters, mode, frequency and duration of the peer intervention, and supervision of peer supporters – are explained in Table 2.

Table 2: Themes emerging from the two identified models of peer support: diabetic patients and community health workers

MODEL 1: DIABETIC PATIENTS		**MODEL 2: COMMUNITY HEALTH WORKERS**	
THEME 1: RECRUITMENT			
SUB-THEME		**SUB-THEME**	
1. Responsibility	**Recruited by healthcare professionals** at the clinic or by the research team [30,31,35]		
2. Origin	From the local community [30,31,33-35]	1. Origin	CHWs from the local community from existing CHW infrastructure [32,36,38,39]
THEME 2: SELECTION			
SUB-THEME		**SUB-THEME**	
1. Criteria	Good glycaemic control [30,31,35,40]	1. Criteria	Education levels Some high school education [36,38]; high school diploma [41]; primary education [41]
	Leadership qualities [30,33-35,40]		Experience Two years of training; healthcare or community experience; subjected to an entrance examination [41]
	Achieve pass mark [34]		Achieve pass mark [37,39]

THEME 3: TRAINING			
SUB-THEME		**SUB-THEME**	
1. Provision	Health-care specialists [30,31,33,35]	1. Provision	Health-care specialists [36,39] Trainers, trained by research members [38]
2. Duration	Two days [31,33,35,40] Three days [30] Four days [34]	2. Duration	**Initial four-days**, followed by two days [36] **Initial five days** followed by five days [39] **Four eight-hour days**, followed by four hours per month for six months [38] 10 eight-hour days [32] **Initial six hours**, two hours follow-up [37]
3. Content	Diabetes-specific information [31,33,35,40] Communication skills [30,31,34,35,40] Tailoring information for the patient [31,33,34,40] Effective individual and group management [30,40]	3. Content	Diabetes-specific information [32,36-39] Communication skills [32,36,38,39] Tailoring information for the patient [32,36] Behaviour change principles [38,39]
4. Theoretical basis for training	Socio-constructivist theory [34] Social cognitive theory [35]	4. Theoretical basis for training	Motivational interviewing principles [36,38,39]

THEME 4: MODE OF PEER INTERVENTION			
SUB-THEME		**SUB-THEME**	
1. Group interventions	[30,33,34,40]	1. Group interventions	[36,37,39,41]
2. Individual interventions	[31,35]	2. Individual interventions	[32,38]
3. Additional strategy	Telephone [30,31,35,40]	3. Additional strategy to group intervention	Individual face-to-face [37,39,41]
THEME 5: FREQUENCY OF PEER INTERVENTION			
SUB-THEME:		SUB-THEME:	
1. Weekly	[30,31,33]	1. Weekly	[32,39,41]
2. Monthly	[30,34,35,40]	2. Monthly	[36,38,41]
		3. Three-monthly	[37,41]

THEME 6: DURATION OF PEER INTERVENTION			
SUB-THEME		**SUB-THEME**	
1. Four weeks	Follow-up at three and six months [33]	1. 40 days	[32]
2. Three months	[31] Follow-up at weeks 24 and 35 [35]	2. Four months	[36,39,41]
3. Six months	[30,40]	3. Six months	[37,38,41]
4. 12 months	[34]	4. 12 months	[41]
THEME 7: SUPERVISION OF PEERS			
SUB-THEME		**SUB-THEME**	
1. Audio-recording	Group meetings were recorded and provided to research team for feedback [30]	1. Evaluation of CHWs	CHWs were evaluated by researcher at health centre and given feedback [36,38]
2. Telephone contact	The research team contacted the peer supporters weekly [30]		
3. Debriefing meetings	Two fortnightly and two-monthly debriefing meetings [35]		
4. Clinic visits	Supervision at the monthly clinic visits, feedback was provided [35]		

Models of peer support

Six papers reported on delivering peer support using diabetic patients [30,31,33-35,40], and the other six papers delivered peer support using CHWs [32,36-39,41].

THEME 1: RECRUITMENT

SUB-THEME: RESPONSIBILITY

Diabetic patients were **recommended as peer supporters by healthcare professionals** at the clinic, or by the research team [30,31,35].

SUB-THEME: ORIGIN

Diabetic patients who were recruited as peer supporters were individuals from the community [30,31,33-35]. CHWs were recruited as peer supporters from the existing infrastructure of CHWs in the local community [32,36,38,39].

THEME 2: SELECTION

SUB-THEME: CRITERIA

The selection of diabetic patients as peer supporters was guided by good glycaemic control [30,31,35,40] and/or leadership qualities [30,33-35,40]. One paper evaluated diabetic patients after training; patients were selected only if they achieved a pass mark [34]. As part of the selection criteria of CHWs as peer supporters, three papers report certain levels of education and/or experience [36,38,41], while two papers evaluated CHWs after training; they were selected only if they achieved a pass mark [37,39].

THEME 3: TRAINING

SUB-THEME: PROVISION

Four papers [30,31,33,35] report that diabetic patients were trained as peer supporters by healthcare specialists; two other papers [34,40] did not report who provided training to diabetic patients. In two papers [36,39], training for CHWs as peer supporters was provided by healthcare specialists; another paper [38] used trainers who had been trained by the research team, and in the other three papers [32,37,41], it was unclear who had provided the training to the CHWs.

SUB-THEME: DURATION

The duration of the training of **diabetic patients as peer supporters** ranged from two to four days [30,31,33-35,40]. The duration of the training of **CHWs as peer supporters** ranged from six hours to 10 eight-hour days [32,36-39].

SUB-THEME: CONTENT

The content of the training of **diabetic patients as peer supporters** included diabetes-specific information, communication skills, effective individual and group management, and tailoring information for the patient [30,31,33-35,40]. The content of the training of **CHWs as peer supporters** also included diabetes-specific information, communication skills, effective individual and group management and tailoring information for the patient, as well as behaviour change principles [32,36-39].

SUB-THEME: THEORY BASIS

Only two papers [34,35] reporting on **diabetic patients as peer supporters** used the social cognitive and socio-constructivist theories as the basis for training. Four papers

[30,31,33,40] do not report on a theory used as basis for training. Three papers [36,38,39] on **CHWs as peer supporters** used motivational interviewing principles as the theoretical basis for training, and three papers [32,37,41] do not report on using a theory as the basis for training.

THEME 4: MODE OF PEER INTERVENTION

SUB-THEME: GROUP INTERVENTION

For **diabetic patients as peer supporters**, four papers [30,33,34,40] used group interventions, and for the **CHWs as peer supporters**, four papers [36,37,41,39] used group interventions.

SUB-THEME: INDIVIDUAL INTERVENTION

In the papers with **diabetic patients as peer supporters**, two papers [31,35] used individual interventions. In the papers with **CHWs as peer supporters**, two papers [32,38] used individual interventions. Individual support was used additionally in three of the group intervention papers [37,41,39] in the CHW group.

SUB-THEME: TELEPHONE INTERVENTION

Four of the papers [30,31,35,40] reporting on **diabetic patients as peer supporters** used telephone support as an additional peer support strategy.

THEME 5: FREQUENCY OF PEER INTERVENTION

The frequency of peer support by **diabetic patients as peer supporters** ranged from weekly to monthly [30,31,33-35,40], and when **CHWs served as peer supporters**, the frequency ranged from weekly to every three months [32,36-39,41].

THEME 6: DURATION OF PEER INTERVENTION

The duration of the peer intervention when **diabetic patients served as peer supporters** ranged four weeks to 12 months [30,31,33-35,40], and the duration ranged from 40 days to 12 months when **CHWs were peer supporters** [32,36-39,41].

THEME 7: SUPERVISION OF PEERS

Supervision of **diabetic patients serving as peer supporters** is reported by only two of the six papers [30,35]; four papers do not report on supervision of diabetic patients serving as peer supporters [31,33,34,40]. Supervision of **CHWs serving as peer supporters** is also reported in only two of the six papers [36,38]; four papers do not report on supervision of CHWs as peer supporters [32,37,39,41].

SUB-THEME: AUDIO-RECORDING

When **diabetic patients were used as peer supporters**, supervision was conducted by audio-recording group meetings, which was provided to the research team for feedback [30].

SUB-THEME: TELEPHONE CONTACT

When **diabetic patients served as peer supporters**, the research team contacted the peer supporters weekly as a form of supervision [30].

SUB-THEME: DEBRIEFING MEETING

In studies using **diabetic patients as peer supporters**, two fortnightly and two-monthly debriefing meetings were held with peer supporters as a means of supervision [35].

SUB-THEME: CLINIC VISITS

When **diabetic patients were peer supporters**, supervision was performed by conducting monthly clinic visits and providing feedback [35].

SUB-THEME: EVALUATION OF CHWS

CHWs serving as peer supporters were evaluated by the researcher at the health centre, and feedback was provided [36,38].

Discussion

This study was based on the IMBP, which suggests that an individual will perform the intended behaviour if the necessary knowledge and skills are present and if contextual factors allow the behaviour to be performed. Background factors cannot be ignored, because they have an impact on attitudes, perceived norms and self-efficacy and, eventually, on the intention to perform the behaviour. We performed this systematic review because we believe that face-to-face peer support could serve as a strategy to develop self-management knowledge and skills and minimise contextual constraints.

This review shows that diabetic patients and CHWs are commonly used models of face-to-face peer support, as a self-management strategy for T2D patients in LMICs. The review, furthermore, identified the following themes as fundamental to the planning and implementation of face-to-face peer support models: selection, recruitment, training, mode, frequency and duration of the peer intervention, and supervision of peer supporters.

The findings of the review were that the recruitment and selection criteria of diabetic patients as peer supporters focused on good glycaemic control and/or leadership qualities and/or a recommendation by a healthcare professional that a diabetic patient from the

community would be a suitable peer supporter. For CHWs, recruitment took place from the existing infrastructure of CHWs within a community; criteria, such as educational levels and experience, were very poorly described. The training of peer supporters featured as an important component of the strategy, and healthcare specialists were commonly used to conduct training for both models. The duration of training ranged from six hours to 10 days for the two models. Similar content was covered by the two models, and included diabetes-specific information, communication skills, effective individual and group management, tailoring information for the patient and behaviour change principles. Motivational interviewing was the most common theory basis used for the peer interventions. Face-to-face, either group or individual-based, peer support interventions were often supplemented by another method of peer support, and supervision of peer supporters was poorly described by studies using either model.

The effects of the face-to-face peer support is associated with improvement in various clinical and behavioural outcomes, such as physical activity [35,36,38], mean diastolic blood pressure [31,32,36,40], mean systolic blood pressure [32,36], quality of diabetes care [30,38], HbA1c [30-34,37-41], consumption of fruit and vegetables [32,38], medication adherence [31,32,38,41], body mass index (31,34,41], cholesterol [31,38,40] waist circumference [34] and diabetes self-care behaviour [30,40,41].

Although the context differs in high and LMICs, studies in these countries support the findings of this review that, when diabetic patients and CHWs are used as peer supporters, self-management by patients with T2D can be improved. Thom et al. published a randomised controlled trial conducted in the United States of America to test whether clinic-based peer support would improve the glycaemic control of poorly controlled diabetic

patients [42]. The study clearly describes utilising the electronic records of an institution to identify potential peers with an HbA1c of >8.5%, and who spoke either English or Spanish; other potential peer supporters were recommended by the clinic staff. Potential peer supporters attended 35 hours of training over eight weeks; the training was provided by healthcare specialists on specific content, but the study does not report the theoretical basis of training. Selection as a peer supporter was dependent on passing a written and oral examination. The peer intervention consisted of two or more group sessions over six months, supplemented by two telephone contacts per month. The study does not report on supervision. The study found a significant reduction in HbA1c in the peer support group.

Similarly, Baumann et al. conducted a study in Uganda to test the feasibility of a peer support intervention to improve diabetes self-care behaviours, glycaemic control, social support and emotional support and linkages to care [43]. The clinic staff recruited participants at the clinic and via radio. Peer supporters had to have T2D, speak and read English, be willing to receive training in communication skills, and agree to weekly contacts with patients. Patients had to agree to weekly contact with peer supporters. Specialists in diabetes care delivered diabetes training to the peer supporters for five hours and an additional hour on communication skills and the daily management of diabetes. The training was provided in English on one day, and on another day, diabetes training was delivered to the patients for five hours in English and the local language. Peer supporters and patients met on the patient training day. They were matched on age and gender and agreed to contact each other weekly, either by personal contact or by telephone, during the four-month period. All participants were provided with mobile phones with a prepaid network. Participants received a logbook to record all contact with peers. The results of the study

demonstrated improvements in self-reported eating behaviour, HbA1c, and diastolic blood pressure. The study also showed that 93% (n=40) of contact was by cell phone and 60% (n=28) by personal contact.

Spencer et al. conducted a randomised controlled trial in the United States and tested the effectiveness of a CHW intervention amongst African American and Latino adults with T2D [44]. The study reports that ethnically matched CHWs from each community were assigned to the two communities. They received 80 hours of training by the research team; the training combined empowerment approaches and social cognitive theory principles. Content covered was diabetes-specific content and behaviour change principles. The peer intervention consisted of 11 two-hour group sessions held every two weeks by the CHWs, and two home visits per month, combined with telephone contact every two weeks. The research team supervised one group session per CHW to evaluate fidelity. The results of the study showed a mean HbA1c improvement in the intervention group, as well as a greater self-reported understanding of diabetes compared to the control group.

Similarly, De Souza et al. conducted a randomised control trial in Brazil to assess the effect of a diabetes education programme delivered to community health workers in improving the metabolic control of patients with T2D [45]. The selection and recruitment of CHWs were not reported in the study, as the CHWs were part of a primary care unit in a Family Health Strategy Model serving a specific area of the population. Four CHWs were assigned to the intervention group that received structured weekly diabetes training for about 60 minutes for one month by the researcher and four CHWs to the control group, that received health education sessions on diabetes, asthma, tuberculosis, and contraception of about 60 minutes for one month by the researcher. The knowledge of participants and CHWs was

tested before the intervention and after the intervention. CHWs in both groups visited the participants once a month and delivered information as received during training; namely, the intervention group provided diabetes training, and the control group offered general training. Three months after the training, baseline measurements were repeated on participants and displayed a significant reduction in HbA1c in both intervention and control groups. High-density lipoprotein cholesterol levels and stress-related scores also reduced in both groups.

Werfalli et al., on the other hand, conducted a recent systematic review on the effectiveness of peer and CHW-led diabetes self-management programs in LMICs in diabetes care [46]. After synthesising 11 papers, the results were associated with inconsistency in terms of improvement in clinical, behavioural, and psychological outcomes.

Similarly, another systematic review, on the effect of peer support on diabetes outcomes in adults, included 25 studies from high-income countries. The study found that evidence was too inconsistent to support the endorsement of diabetes peer support [14].

Based on the findings of the current review and other prior studies, it can be concluded that the identified face-to-face peer support models may be used as a self-management strategy for patients with T2D in LMICs. However, these conclusions have to be drawn with caution, since peer support is complex, and transferability can be influenced by the cultural, emotional, psychological and social environment. The generalisability of the models will depend on available and existing resources within the context, and it is imperative that this is taken into consideration.

Limitations

A limitation of the review is that new studies related to the review question may have been generated since the cut-off date of the review. However, an update of the systematic review will be performed as soon as possible. Another limitation of the study is that assessment from the included studies was limited to published data only.

Conclusion

The results of this review suggest that face-to-face peer support models, either individual or group-based, can be used as a self-management strategy for patients with T2D in LMICs. The results suggest that diabetic patients and/or CHWs can be used to provide face-to-face peer support to patients with T2D in LMICs. Furthermore, the results provide evidence that suggests that effective recruitment, selection, training and supervision of peer supporters are essential in the context of peer support models. The results of the review will be valuable for developing countries with resource-scarce settings.

Implications for further research

Based on the results of the review, these findings inform researchers on the acceptability of face-to-face peer support models, either individual or group-based, in LMICs. Furthermore, the results can assist in the development and planning of face-to-face peer support interventions that aim to improve the self-management of patients with T2D in LMICs and the importance of considering contextual factors.

Abbreviations

T2D: Type 2 diabetes; LMIC: low and middle-income country; CHW: community health worker; HbA1c: glycosylated haemoglobin; GNI: gross national income; IMBP: Integrated model of behaviour prediction; PRISMA: preferred reporting items for systematic reviews and meta-analyses; CASP: critical appraisal skills programme.

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the Health Sciences Research Ethics Committee of the University of Free State. The ethics clearance number is UFS-HSD2017/1545.

Consent for publication

Not applicable.

Availability of data and material

Not applicable. All data has been provided within the manuscript and additional supporting files.

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

Both authors participated in the review, quality assessment and synthesis of studies. Both authors have read and approved the manuscript.

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Authors' information (optional)

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CHAPTER 4
THE IMPACT OF A FACE-TO-FACE PEER SUPPORT INTERVENTION ON ADULTS WITH TYPE 2 DIABETES: A CLUSTER-RANDOMISED TRIAL

4.1 INTRODUCTION

In the previous chapter, the systematic review provided the best available evidence on face-to-face peer support models for adults with T2D in LMICs. This evidence guided the development and implementation of a face-to-face peer support programme. A model led by CHWs was selected due to the infrastructure available in the community. This chapter will present a manuscript that describes the impact of a face-to-face peer support intervention on adults with Type 2 diabetes: a cluster-randomised trial.

4.2 MANUSCRIPT DETAILS

Title	The impact of a face-to-face peer support intervention on adults with Type 2 diabetes: a cluster randomised trial
Authors	Melanie Pienaar; Marianne Reid; Mariette Nel
Journal	*Journal of Endocrinology, Metabolism and Diabetes of South Africa*
Journal details	Peer-reviewed journal Listed as an accredited journal by the Department of Education and Training [South Africa] Impact factor 0.15 (2018/2019)
Status	Under review

4.3 ASSOCIATED ADDENDA

- Link to author guidelines (Addendum B)
- Approval from Health Sciences Research Ethical Committee (Addendum C)
- Permission from Department of Health Free State (Addendum G)

- Patient questionnaire on demographics and quality of life for intervention study (Addendum H)
- Sesotho Health Literacy Tool (Addendum I)
- Patient information leaflet for intervention study (Addendum J)
- Consent form for both patients and peer supporters in intervention study (Addendum K)
- Peer supporter questionnaire on demographics for intervention study (Addendum L)
- Peer supporter questionnaire – Measure of effective attributes of trainers (Addendum M)
- Peer supporter information leaflet (Addendum N)
- Peer support programme (Addendum O)

THE IMPACT OF A FACE-TO-FACE PEER SUPPORT INTERVENTION ON ADULTS WITH TYPE 2 DIABETES: A CLUSTER-RANDOMISED TRIAL

Corresponding Author: Ms Melanie Pienaar, MSocSci (Nursing)

Institutional address: University of Free State, 205 Nelson Mandela Drive, Park West, Bloemfontein, 9301, South Africa

Mobile: 27637774452

E-mail: pienaarma@ufs.ac.za

Author: Dr M. Reid, PhD

Institutional affiliation: University of Free State, South Africa

Office number: 0514019747

Author: Ms Mariette Nel, MMedSc

Institutional affiliation: University of Free State, South Africa

Office number: 0514013116

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Declaration regarding authorship - MP led the conception, design, data acquisition, analysis and interpretation of the data. MR collaborated design, data acquisition, analysis and interpretation of the data. MN led the data analysis process. All authors participated in critical revision of the manuscript and approved the manuscript.

Ethics committee approval - Ethics approval was obtained from the Health Sciences Research Ethics Committee of the University of Free State (UFS-HSD2017/1546).

Conflict of interest - The authors report no conflicts of interest.

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Abstract

Objective: To establish the impact of a face-to-face peer support intervention on adults with Type 2 diabetes in South Africa.

Methods: We conducted a cluster randomised controlled trial involving 288 adults with Type 2 diabetes from six communities in the Free State province. Individuals (n=141) in three communities were randomly allocated to the intervention group, and individuals (n=147) in another three communities were randomly allocated to the control group. Trained community health workers led monthly group sessions and home visits. The control group received usual care. The primary outcome of the study was glycated haemoglobin (HbA1c), measured at baseline and endpoint after four months. Secondary outcomes included blood pressure, body mass index and waist circumference, measured at baseline and endpoint. Descriptive statistics were calculated per group.

Results: No significant changes from baseline were found between groups regarding HbA1c (p=0.87), body mass index (p=0.21), waist circumference (p=0.24) and systolic blood pressure (p=0.13). Compared to the control group, the intervention group had a significant improvement in diastolic blood pressure (p=0.02).

Conclusions: The face-to-face peer support intervention delivered by trained community health workers in a semi-urban rural area resulted in a significant improvement in diastolic blood pressure of adults with Type 2 diabetes.

Keywords:

peer support, adults, type 2 diabetes, self-management, community health workers, South Africa

Introduction

Diabetes is a health pandemic that currently affects more than 463 million people globally. A further 374 million people are at risk of developing diabetes as a result of impaired glucose tolerance.[1] Likewise, South Africa has approximately 7.7% male and 11.8% female citizens diagnosed with diabetes in a population of about 55.4 million people.[2] It is expected that 60% of this population is unscreened and undiagnosed.[3] Due to its chronic nature, ongoing support is an integral part of diabetes care. Peer support is a promising approach for providing ongoing support in the self-management of diabetes and other chronic diseases.[4] A peer can

be interpreted in different ways. In this study, a peer refers to a community health worker (CHW), who works and lives in the same area as the patients they serve. Within the South African context, CHWs have recently been integrated within the healthcare system; they receive a minimal wage, work a specified number of hours per week and generally receive random training related to basic health information.

CHWs can be expected to have strong connections with the community they serve, since they share the same language, culture and value systems. These characteristics could make CHWs reliable and respected members of the community and, therefore, CHWs could have great influence on their community.[5] Literature acknowledges that CHWs could bridge the gap between the community and the healthcare system, since CHWs can inform healthcare providers about community needs while also disseminating information to the community in a culturally appropriate manner.[6] CHWs may bridge the gap by providing accessible care in a specific area through emotional, appraisal, informational and instrumental support,[7] provided they are adequately prepared for this role through training.[8] Various studies support the integration of CHWs in health systems.[4,6] It is, therefore, clear that peer support by CHWs could be a vehicle for providing ongoing support to encourage the self-management of diabetes.

The management of diabetes is often less than ideal in semi-urban rural areas. Typically, semi-urban rural areas may be home to households with limited access to electricity, piped water and a sewage disposal system. Additionally, access to internet and computers may be very low in these areas.[9] Healthcare centers in these areas may experience insufficient staffing, inadequate resources, such as basic equipment necessary for diagnosis and monitoring, and unavailability of medicine, little to no patient education and a large patient burden. Healthcare professionals in these areas are often demotivated and may integrate patient management protocols poorly.[10] Additionally, patients with diabetes commonly exhibit low levels of knowledge, negative attitudes and practices contrary to those recommended.[11] This situation could be compounded by the presence of language barriers and low patient literacy.[12]

The specific focus of the Thaba Nchu Botshabelo (TNB) Peer Support Study, as reported on in this study, was informed by the development of a health dialogue model for patients with diabetes, and who lived in a predominantly semi-urban rural area. During development of this model, diabetes-related knowledge and practices of CHWs were found to be moderate, and

that CHWs have a positive attitude towards diabetes.[13] The model, furthermore, highlighted the preference of patients for one-on-one and group-based health communication, instead of other forms of communication such as internet-based communication. Patients valued interaction with trained health workers and fellow patients in their own language.[13,14]

There is substantial literature supporting the positive effects of peer support on diabetes outcomes.[7,15] However, research on peer support programmes in diabetes, suitable for this context, is limited. The aim of this study was, therefore, to establish the impact of face-to-face peer support intervention on adults with Type 2 diabetes in South Africa.

Methods

Study design

The TNB-Peer Support Study is a cluster-randomised trial conducted in accordance with the requirements of the Consolidated Standards of Reporting Trials (CONSORT) statement.[16]

Participants

Six communities in a semi-urban rural area were recruited for the TNB-Peer Support Study by means of information sessions held at primary healthcare centres (PHCs). Communities were eligible if they made use of CHWs at PHCs. Three communities were randomly allocated to the intervention group and three to the control group. There were two phases in recruitment: In Phase 1, the author recruited individuals from each community during routine PHC appointments. Individuals were purposively selected and were eligible to participate in the study based on the following criteria: aged ≥18 years; diagnosed with Type 2 diabetes by a physician; who were willing to participate and whose home language was Sesotho. This language criterion was significant, as nearly three quarters of the provincial population use Sesotho as home language.[17] Individuals acutely ill and with known psychiatric/psychological disorders that may impair judgement and memory were excluded.

Only the intervention group underwent a second phase of recruitment. The author purposively recruited CHWs (n=31) from the communities and invited them to participate in the study. In total, about 10 CHWs were selected from every intervention community based on the following criteria: had completed 12 years of schooling successfully; resided in the same community as participants; possessed good interpersonal skills and were self-motivated.[18] Selected CHWs took part in monthly interactive training sessions conducted in English lasting 60-120 minutes for four months at the respective PHCs. The following topics

were addressed during the training: Session 1, an overview of diabetes; Session 2, Healthy eating; Session 3: Physical activity and handling stress, and Session 4, complications of Type 2 diabetes. The author conducted the training sessions using the principles of motivational interviewing, such as active listening, asking open-ended questions and reflecting.[19] The International Diabetes Federation's *Peer Leader Manual* guided the content of training.[20]

Ethics approval was obtained from the Health Sciences Research Ethics Committee of the University of Free State (UFS-HSD2017/1546). All individuals with Type 2 diabetes and CHWs gave written informed consent.

The researchers decided on a sample size of 200 participants, due to time and budgetary constraints: 100 in the intervention group and 100 in the control group. To allow for the effect of losses to follow-up, we aimed to randomise additional participants. Eventually, the actual sample size was 288 participants. A retrospective statistical power calculation of 70.2% was determined for the study.

Randomisation was carried out at the community level by computer-generated random numbers. Due to the nature of the intervention, it was not possible to blind either individuals with Type 2 diabetes, or CHWs.

Interventions

Usual care

Individuals in the control group received usual care at the PHCs. Usual care involved collecting medication at the PHC every month, random health talks in the waiting area and consultation with the clinical nurse practitioner or doctor once every three months.

Peer support intervention

Individuals in the intervention group received peer support for four months, in addition to usual care. CHWs conveniently selected five individuals who lived closest to them to their care. These individuals met the same CHWs in a private area at the PHC every month for four months. The CHWs facilitated face-to-face group sessions lasting about 60 minutes. The CHWs presented the group sessions in the individuals' home language, following the same principles used during training. The author and other healthcare professionals were present on site if the CHWs needed assistance, but no healthcare professionals were present during the group sessions. The CHWs also conducted home visits once a month to reinforce knowledge

and skills, to listen to the concerns of the individuals and work with them to solve problems. CHWs worked in pairs to support each other during group and home visits.

The author supported the CHWs throughout the study. Debriefing sessions were provided for the CHWs on a monthly basis to discuss their experiences and challenges related to the peer support intervention. The author was able to give feedback to the CHWs on their monthly performance, as group sessions were audio-recorded, and a written report was provided of the home visits. A social media group was created for the CHWs of each community, to allow the CHWs to communicate with the author at any time and to allow the author to provide support to the CHWs.

Measurements

The primary outcome of the study was to establish the impact of the face-to-face peer support intervention on adults with Type 2 diabetes as measured by HbA1c. Changes in this outcome were assessed from baseline to endpoint. In addition, secondary outcomes, such as blood pressure, body mass index (BMI) and waist circumference were also assessed from baseline to endpoint.

At baseline, individuals in both the intervention and control groups completed, first, an adapted South African diabetes questionnaire that gathered demographic data and assessed quality of life and health,[21] and secondly, the validated Sesotho Health Literacy Test (SHLT), which measured the general health literacy level of the individuals.[22] The questionnaire and SHLT were available in the home languages of the individuals and were completed by trained research assistants at the respective PHCs. The author measured HbA1c levels using the BioHermes Automatic Glycohemoglobin Analyzer and by applying standard techniques and controls. The blood pressure of individuals was measured using the WelchAllyn Automatic Blood Pressure Monitoring System.

Body weight, height and waist circumference (midpoint between the lower costal margin and iliac crest) were also measured. Blood pressure and BMI measurements were taken by the author and trained research assistants at the respective PHCs.

Data analysis

Descriptive statistics, namely, frequencies and percentages for categorical data and medians and percentiles for numerical data, were calculated per group. The change from baseline was calculated and described by means of the relevant statistical test, given the data distribution

was skewed. Kruskal-Wallis test was used to describe numerical data and, for categorical data, the Chi-squared test or the Fisher's Exact Test for small samples was used. The change within a group was described by means of McNemar's test; p-values ≤ 0.05 were taken to indicate statistical significance. SAS software was used to analyse all data.

Results

CHW recruitment began in December 2018 and recruitment of patients with Type 2 diabetes began in January 2019, during their routine PHC appointments. From January 2019 to March 2019, the baseline testing of 288 individuals with Type 2 diabetes from the six communities from a semi-urban rural area was completed. Endpoint testing took place from May to August 2019 during routine PHC appointments of individuals, with 242 individuals from the six communities being tested. In some cases, individuals were contacted by phone to complete endpoint testing. In total, 31 CHWs, about 10 from each of the three intervention communities, were recruited and trained to provide peer support to the individuals selected in their area. One CHW withdrew after the first training session due to personal reasons. Over the four months of the TNB-Peer Support Study, 27 (19.1%) in the intervention group and 17 (11.5%) in the control group were lost to follow-up, however, no statistical difference between the groups was noted (p=0.07). The study had an average individual attrition rate of 50% across the peer support group sessions. The individuals' self-reported reasons for attrition included transport problems, clinic visits interfering with work and time constraints. The flow of individuals is reported in Figure. 1.

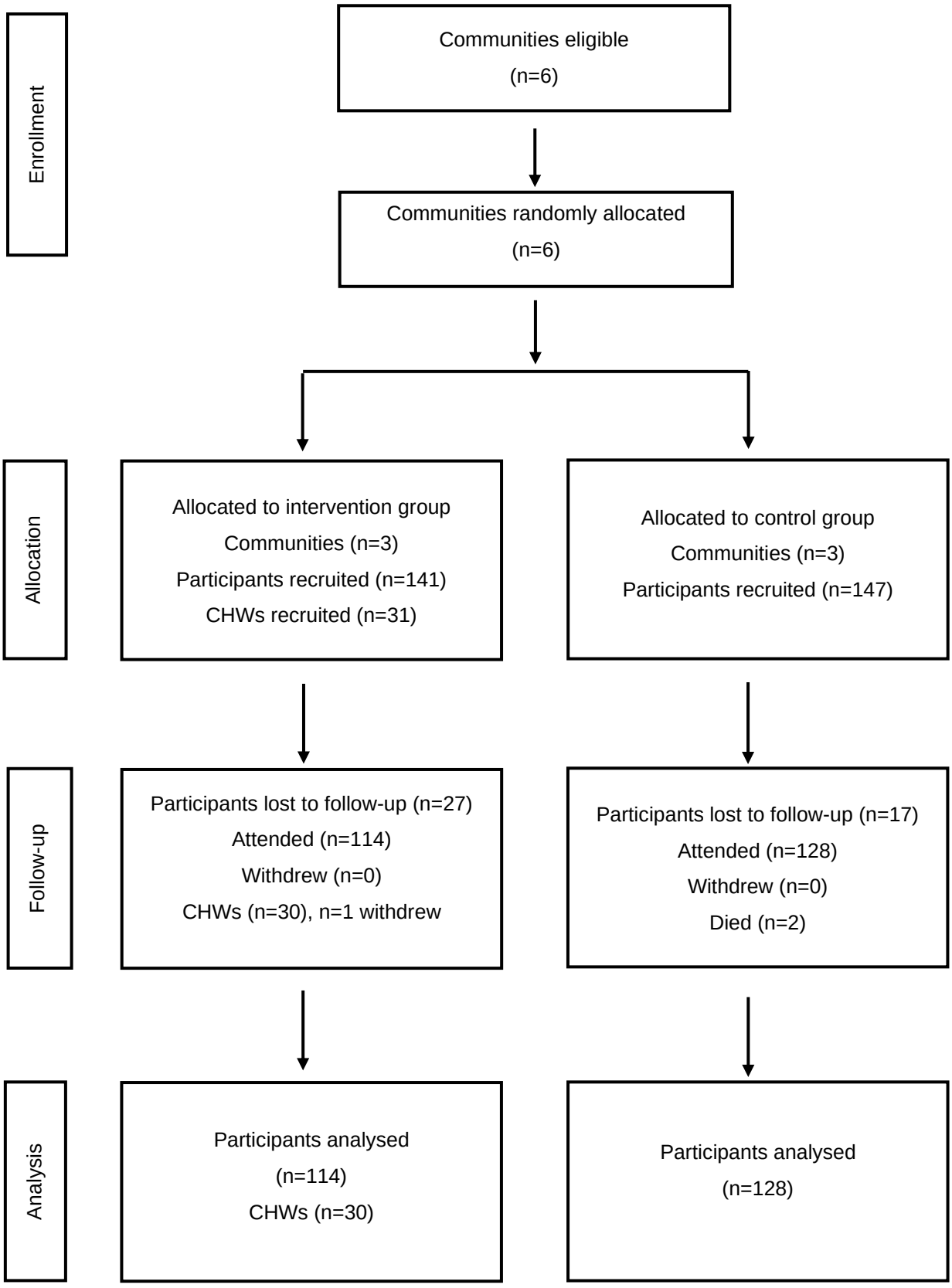

Figure. 1: Participant flow

Table 1 shows the baseline characteristics and clinical measurements of the peer intervention group and the control group. The intervention and the control group were similar at baseline, although the control group had lower levels of education ($p<0.001$), quality of life ($p=0.003$) and general health literacy levels ($p<0.001$).

Table 1: Baseline characteristics and clinical measurements of the intervention group and the control group

Demographic characteristics	Intervention group	Control group	p-value
Gender: Male, n (%)	22 (15.6)	24 (16.3)	
Female, n (%)	119 (84.4)	123 (83.7)	0.86
Age, years: Median (IQR)	60 (54, 69)	62 (56, 69)	0.46
Level of education, n (%)			
No schooling	2 (1.4)	11 (7.5)	
Some high school	70 (49.7)	35 (23.8)	
Completed high school	21 (14.9)	23 (15.7)	
Certificate	0 (0)	4 (2.7)	
Diploma	1 (0.7)	0 (0)	
Primary school	47 (33.3)	74 (50.3)	*<.001
Quality of life, n (%), self-reported			
Problems with walking	27 (19.2)	33 (22.5)	0.49
Problems with self-care	5 (3.6)	7 (4.8)	0.60
Problems with usual activities	9 (6.4)	15 (10.2)	0.24
Happy most days of the week	115 (81.6)	96 (65.3)	*0.003
Years living with diabetes, Median (IQR)	6 (3,12)	8 (3,14)	0.20
Taking medication for other known illnesses, n (%)	120 (85.1)	132 (89.9)	0.23
Other known illnesses, n (%), self-reported			
Cardiovascular	115 (95.8)	129 (97.7)	0.48

Asthma	2 (1.7)	5 (3.8)	0.45
Epilepsy	2 (1.7)	2 (1.5)	1.00
Mental illness	4 (3.3)	0 (0)	0.05
HIV/AIDS	4 (3.3)	3 (2.3)	0.71
Arthritis	6 (5.0)	5 (3.8)	0.63
Gastro-intestinal	0 (0)	1 (0.8)	1.00
Renal	1 (0.8)	0 (0)	0.47
General health literacy level, n (%)			
Low	2 (1.4)	23 (15.7)	
Moderate	31 (22)	41 (27.8)	
High	108 (76.6)	83 (56.5)	*<.001
HbA1c, mmol/mol, Median (IQR)	63 (43, 81)	59 (44, 80)	
HbA1c, %, Median (IQR)	7.9 (6.1, 9.6)	7.5 (6.2, 9.5)	0.4
BMI, kg/m², Median (IQR)	31.3 (27.7, 35.1)	34.7 (29.1,38.7)	*0.003
Waist circumference, cm, Median (IQR)	102 (96.5, 113)	106 (97, 113)	0.2
Blood pressure, mmHg			
Systolic blood pressure, Median (IQR)	139 (127, 156)	141 (124, 153)	
Diastolic blood pressure, Median (IQR)	83 (76, 93)	85 (77, 90)	

Data is reported as median (IQR) for numerical variables, n (%) for categorical variables.

IQR, interquartile range

**p-value ≤0.05*

Table 2 shows the clinical outcomes at endpoint and changes in clinical outcomes from baseline for the intervention and the control group. After four months, there were no differences in HbA1c between the intervention and control groups. Systolic blood pressure, BMI and waist circumference also showed no difference after four months. However, individuals in the intervention group had significantly lower diastolic blood pressure measurements (p=0.01) than those in the control group.

Table 2: Clinical outcomes at 4 months and changes in clinical outcomes from baseline

Variable	Clinical outcomes at 4-months			Changes in clinical outcomes from baseline		
	Intervention	Control	P-value	Intervention	Control	P-value
HbA1c, mmol/mol (IQR)	64 (48,83)	59 (49,79)				
HbA1c, %, Median (IQR)	8.0 (6.5, 9.7)	7.5 (6.6, 9.4)	0.92	0.4 (-0.5, 1)	0.2 (-0.2, 0.8)	0.87
BMI, kg/m², Median (IQR)	31.7 (27.4, 35.9)	34.7 (29.1, 38.9)	0.26	-0.1 (0.7, 0.5)	0.1 (-0.6, 0.6)	0.21
Waist circumference, cm, Median (IQR)	101.0 (96, 111)	106.0 (97, 114)	0.17	0 (-2.5, 1.5)	0 (-2, 1)	0.24
Blood pressure, mmHg						
Systolic BP, Median (IQR)	140 (130, 155)	145 (130, 160)	0.11	1 (-12, 18)	5 (-4, 20)	0.13
Diastolic BP, Median (IQR)	80 (70, 90)	85 (77,91)	*0.01	-3 (-12, 7)	1 (-6, 8)	*0.02

Data is reported as median (IQR) for numerical variables, n (%) for categorical variables.

IQR, interquartile range

**p-value ≤0.05*

Discussion

The TNB-Peer Support Study demonstrated that a face-to-face peer support intervention had no effect on HbA1c, systolic blood pressure, BMI and waist circumference. However, a significant improvement in diastolic blood pressure was noted in the intervention group. The improvement in diastolic blood pressure is significant considering that hypertension is a major risk factor for cardiovascular mortality and morbidity in patients with diabetes.[23,24] The results of this study are consistent with another study related to diastolic blood pressure improvement.[25]

In the TNB-peer support study, the median HbA1c of the intervention group at baseline was 7.9, while it was 7.5 for the control group, with no significant changes noted at endpoint. The results of this study are consistent with other studies on peer support interventions related to diabetes that did not find significant differences in glycaemic index.[23,24] It is interesting to note that, in these studies, the baseline HbA1c of the participants was <8%.

The TNB-peer support study contrasts with other studies that demonstrated significant improvements in HbA1c.[26,27] These studies had participants with HbA1c levels >8% at baseline. It therefore seems likely that, when the HbA1c is targeted, peer support will be more effective in participants with HbA1c level >8%. Whittle *et al*. states that HbA1c level within normal limits or close to normal ranges is highly unlikely to be influenced by peer support.[28] Egbujie *et al*. recommends triaging and selection criteria for HbA1c, since participants with HbA1c level >8% are more likely to benefit from peer support than participants with HbA1c level <8%.[7]

Literature acknowledges the high patient attrition rate for face-to-face diabetic group sessions,[5,29] and factors such as transportation costs, family obligations and scheduling conflicts have been identified as self-reported barriers to attendance.[5] Thus, literature recommends that a combination of communication strategies (group-based, one-on-one, mobile telephone or web-based), tailored to the unique needs of individuals and groups, is incorporated during health communication.[24,30] A combination of communication strategies has been known to increase the impact and efficiency of the health message and expose as many people as possible to the health message.[30] The use of one-on-one home visits, as a second mode of peer support in the TNB-peer support study, was, thus, a strength of the study. In this way, any information lost in the group sessions, could be acquired during the home visits. The home-visits also served as a platform to reinforce knowledge and skills,[23] to

listen to the concerns of individuals and guide the individuals with regard to disease management.[31]

A second strength of the TNB-peer support study was that facility managers at the PHCs supported the author with regard to the peer support model. There was open communication between the parties, which ensured the availability of the CHWs for training, a private area every month for patient group sessions and CHWs' training sessions. However, the reality of limited physical space in PHC cannot be ignored.

A real-life limitation in the TNB-peer support study was the challenges faced by CHWs in the healthcare system, such as delayed remuneration. CHWs commonly have employment contracts of short duration, which are extended or terminated randomly, and they are remunerated with a small stipend that is generally sporadic in nature.[32] At the time of the study, CHWs had not received their stipends for a few months and they were very disgruntled. One group of CHWs was particularly demotivated and this attitude could possibly have affected patient group attendance. Despite the realisation that CHWs form an integral part of the healthcare system, policy formulation is unclear in this respect, which causes tremendous hardship, attrition and demotivation amongst CHWs.[33] CHWs are the crux of this particular model of peer support and, therefore, they need to be supported. The researcher offered each CHW a monthly transport fee as an incentive to do home visits. Another limitation of the TNB-peer support study was the high individual attrition rate in the peer support group sessions, which was mitigated by home visits, as described above.

Conclusions

This cluster randomised controlled trial indicates that it is feasible to implement a face-to-face peer support intervention in adults with Type 2 diabetes in a semi-urban rural area in the Free State, despite the modest results. The study resulted in a significant improvement in diastolic blood pressure of individuals. No differences were, however, found regarding the HbA1c, systolic blood pressure, BMI and waist circumference variables. The following recommendations for the study are made:

- The workload of the intervention was high, due to the dedicated follow-up of CHWs, and this should be taken into consideration during the planning and implementation of a peer support intervention.

- The study period was relatively short and may have limited other significant changes in variables from being observed and a longer study period is recommended in future research.
- If HbA1c is the primary outcome of such an intervention, researchers should consider triaging patients with HbA1c >8% for inclusion in a peer support programme.

Due to the significance of outcomes other than physiological outcomes in a randomised control trial, the researcher explored the experiences of the patients who took part in the TNB Peer Support Intervention and reported it elsewhere.

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CHAPTER 5
A DIABETES PEER SUPPORT INTERVENTION: PATIENT EXPERIENCES USING THE MMOGO-METHOD®

5.1 INTRODUCTION

This chapter will present a manuscript that describes the experiences of patients who took part in the diabetes peer support intervention using the Mmogo-method®.

5.2 MANUSCRIPT DETAILS

Title	A diabetes peer support intervention: Patient experiences using the Mmogo-method®
Authors	Melanie Pienaar, Marianne Reid
Journal	*Health SA Gesondheid*
Journal details	Open access Peer-reviewed journal Listed as an accredited journal by the Department of Higher Education and Training (South Africa) Impact factor 0.78 (2018 Journal metrics)
Status	Under review

5.3 ASSOCIATED ADDENDA

- Link to author guidelines (Addendum B)
- Approval from Health Sciences Research Ethical Committee (Addendum C)
- Permission from Department of Health Free State (Addendum G)
- Information leaflet for the visual-based narrative inquiry, Mmogo-method® (Addendum P)
- Consent form for Mmogo-method® (Addendum K)
- Consent form for audio and video recording (Addendum Q)

A DIABETES PEER SUPPORT INTERVENTION: PATIENT EXPERIENCES USING THE MMOGO-METHOD®

Correspondence to: Melanie Pienaar, MSocSci (Nursing)

Institutional Affiliation: University of Free State, Faculty of Health Sciences, School of Nursing, Bloemfontein, South Africa

Institutional Address: 205 Nelson Mandela Drive, Park West, Bloemfontein, 9301, South Africa

Daytime telephone: 063 777 4452

E-mail: pienaarma@ufs.ac.za

Author: Dr Marianne Reid, PhD

Institutional Affiliation: University of Free State, Faculty of Health Sciences, School of Nursing, Bloemfontein, South Africa

Institution Address: 205 Nelson Mandela Drive, Park West, Bloemfontein, 9301, South Africa

Daytime telephone: 084 461 4634

E-mail: reidm@ufs.ac.za

Abstract

Background: Self-management is the backbone of diabetes care. For patients with type 2 diabetes, this implies choosing a healthy diet, exercising regularly, taking treatment appropriately and making decisions about health. Some patients may find it demanding. In this respect, peer support has been identified as a promising strategy for the self-management of diabetes.

Aim: The study sought to explore the experiences of adults with Type 2 diabetes who had taken part in a diabetes peer support intervention. Such information could lead to the development of practical methods of diabetes self-management, for the management and control of diabetes.

Methods: Twelve purposively sampled Sesotho-speaking women (aged 51–84 years) participated in the Mmogo-method®, a visual-based narrative inquiry. Textual data from audio recordings of discussions, visual data from photographs of constructions, and field notes were triangulated and analysed thematically.

Results: Participants described the peer support intervention as very valuable. They regarded community health workers as an important source of support. The intervention helped participants to make positive lifestyle changes, and because they were exposed to continuous support, their confidence improved. They also experienced a sense of connectedness with other participants. This is a significant finding in patients with diabetes, as it will contribute to successfully sustaining effective self-management behaviour.

Conclusions: Peer support for patients with Type 2 diabetes appeared to be a valued intervention, since participants related well to community health workers, who are ideally positioned in the healthcare system to provide the service.

Keywords: Type 2 diabetes, peer support, patient experiences, Mmogo-method®, South Africa

Introduction

Diabetes is a global health pandemic that currently affects more than 463 million people. It is expected that, by the year 2045, 700 million people will be living with diabetes (International Diabetes Federation 2019). Since self-management is the basis of diabetes control (Wu, Tai & Sun 2019), new, effective ways to improve diabetes self-management is needed. The World Health Organization (2007) has identified peer support as a promising approach that may assist in the self-management of diabetes.

Peer support refers to “the provision of emotional, appraisal, and informational assistance by a created social network member who possesses experiential knowledge of a specific behaviour or stressor and similar characteristics as the target population, to address a health-related issue of a potentially or actually stressed focal person" (Dennis, 2003).

The key components of peer support are *emotional* support, *informational* support, *appraisal* support and *instrumental* support (Egbujie et al. 2018; De Vries et al. 2014). Emotional support may be associated with the sharing of lived experiences (Ju et al. 2018; Heisler et al. 2010), being a ‘shoulder to cry on’ and/ or simply someone to talk to and building a relationship of trust (Yeung et al. 2018). Informational support relates to sharing information and assimilating new knowledge and skills (Yeung et al. 2018; Krishnamoorthy et al. 2018), and appraisal support refers to affirming feelings and behaviour (Dennis 2003). Instrumental support may relate to linking individuals with resources in the community and with healthcare professionals (Urichuk et al. 2018). There is a large body of evidence that supports the positive effects of peer support (Debussche et al. 2018), though some authors are concerned about the inconsistency of findings (Smith et al. 2011). However, little is known about the experiences of the patients who take part in diabetic peer support interventions.

The purpose of this study was to explore the experiences of adults with Type 2 diabetes who took part in a diabetes peer support intervention that used the Mmogo-method®. Such information could lead to the development of practical methods of diabetes self-management, which could help to manage and control the diabetes pandemic.

Methods

Research design

The qualitative methodology of visual-based narrative inquiry was applied in this study, using the Mmogo-method®. The Mmogo-method® is a context-sensitive approach that, through visual projection, could provide a deeper understanding of the meaning people attach to their interaction with others (Roos 2012). The Mmogo-method® is fundamentally similar to focus groups; however, instead of the data depending mainly on group discussions, the participants construct their answers with indigenous materials (Barbour 2013).

Context of research

Diabetes peer support intervention

The current study, which explored the experiences of peer support, was preceded by the Thaba Nchu Botshabelo (TNB) Diabetes Peer Support Intervention. The purpose of the TNB Diabetes Peer Support Intervention was to establish the impact of the peer support intervention on adults with Type 2 diabetes mellitus in terms of glycated haemoglobin (HbA1c), blood pressure, body mass index and waist circumference. In this four-month, cluster randomised control trial, individuals were eligible to participate if they were older than 18 years of age; had been diagnosed with Type 2 diabetes; had no debilitating medical or related conditions; spoke Sesotho and were willing to participate. Community health workers (CHWs) in the purposively selected communities were trained as peer supporters, and they were each allocated to five individuals diagnosed with Type 2 diabetes. Every month, these individuals attended group sessions related to various aspects of diabetes, which were facilitated by the CHWs. CHWs also conducted home visits every month to reinforce information and to provide peer support. The peer support training and intervention were based on the principles of motivational interviewing, which emphasise empathetic, encouraging, guiding and non-judgmental support directed towards improving diabetes self-management. The clinical outcomes of the randomised control trial will be reported separately in a doctoral thesis by the main author.

Sample

The current study explored the experiences of peer support in two groups in the community of Thaba ‘Nchu in the Free State province of South Africa. The majority of patients in this community make use of the public healthcare system and speak Sesotho. The researchers were not able to accurately determine the number of patients diagnosed with Type 2 diabetes in the community of Thaba ‘Nchu.

Participants in the TNB Diabetes Peer Support Intervention were invited to take part in this study, which explored their experiences of peer support. Purposive sampling took place and participants were selected based on their willingness to participate in the study. Data saturation was reached after two group discussions (n=6; n=6). Table 1 represents the demographic data of participants. All the participants in the study were female; the participants had an average age of 49–65 years. The participants had been living with diabetes for 6–10 years and their education level varied. The majority of the patients had comorbidities and the average HbA1c of the group was 6.9–9.2%.

Table 1: Participant demographics (n=12)

Characteristics	Group 1 (n=6)	Group 2 (n=6)
Age, years		
Range	51–84	49–69
Mean	65	60
Duration of diabetes, years		
Range	1–21	2–10
Mean	10	6
HbA1c, %		
Range	5.4–8.9	5.7–12.8
Mean	6.9	9.2
Gender, female (%)	100	100
Having comorbid conditions (%)	83	83

Characteristics	Group 1 (n=6)	Group 2 (n=6)
Level of education (%)		
Primary school	33	17
Some high school	67	0
Completed high school	0	83

Data collection

The research team consisted of one English-speaking researcher, one Sesotho-speaking researcher and one Sesotho-speaking fieldworker – the latter assisted with field notes. Data was collected at the primary healthcare facilities in an environment conducive to group discussions. Data was collected by means of the Mmogo-method®, which is made up of the following four parts.

Part 1: All parties were introduced to each another and the purpose of the study was explained to the participants by the Sesotho-speaking researcher. Although the participants could speak English, they had the option to speak in their native language, Sesotho.

Part 2: Participants were seated in a circle and asked the following question: Can you please make a picture of how you experienced the group sessions and the home-visits during the peer support intervention? Each participant was provided with malleable clay, beads of different colours and shapes, dried grass-straw of various sizes and a round piece of cloth, to build their visual constructions on. All participants completed their designs in approximately 45 minutes.

Part 3: Each participant was given an opportunity to describe her visual construction. Member checking occurred at this stage, to verify the experiences of the participants. After the individual participants had given explanations, the group members could add to information shared by the participant.

Part 4: Participants were debriefed and, in the group, reflected on their experience of the activity. The researchers also debriefed immediately after the activity. The entire process was audio-taped, transcribed verbatim and translated to English – this

served as textual data. Field notes were also made during the group discussions. Visual designs were photographed and served as visual data.

Data analysis

Triangulation of textual data from audio recordings of discussions, visual data from photographs of constructions and field notes occurred, and this led to themes that were analysed. The co-coder and authors coded data independently, after which consensus discussion lead to the emergence of themes that describe the experiences of participants of the diabetes peer support intervention. Direct quotes of participants were used to demonstrate and verify the emerging themes.

Trustworthiness

The researcher applied Lincoln and Guba's criteria of trustworthiness in the study (1985). The triangulation of textual and visual data during data analysis contributed to *credibility* as well as member checking during group discussions. *Transferability* was ensured by the provision of a detailed research context. The researcher, furthermore, engaged with participants until data saturation was reached. Verbatim quotes from participants in the findings of the study and photographs of visual presentations ensured *dependability*. *Confirmability* was achieved by the research assistant taking field-notes during the group discussions as well as the use of an independent co-coder during data analysis and consensus discussions.

Ethical considerations

The Health Sciences Research Ethics Committee of the University of Free State (UFS-HSD2017/1546) provided ethics approval for the study and the Free State Department of Health gave permission to conduct the study.

The study was guided by the ethics principles of beneficence, respect for people and justice in accordance with the Belmont Report (United States Department of Health and Human Services, 1978). Participants provided written consent and permission to record the activities after receiving an explanation regarding the aims, benefits and possible risks of the study. The participants were also informed that their participation was voluntary and that they could withdraw at any stage without penalty.

Results

The following themes that relate to the experiences of the participants of the TNB Diabetes Peer Support Intervention emerged during data analysis: 1) positive lifestyle changes; 2) continuous support and 3) improved confidence and a sense of connectedness with other participants. Direct quotes and visual constructions of the experiences of the diabetes peer support intervention are presented as evidence.

Theme 1: Positive lifestyle changes

The participants in the study found the TNB Diabetes Peer Support Intervention brought about positive lifestyle changes. Such changes were brought about by regular conversations on diabetes-related topics during group sessions and home visits. Participants started to have a better understanding of diabetes and the range of related physical changes and symptoms. Their understanding of symptoms related to prolonged high levels of blood glucose, which lead to complications of diabetes, also became clearer. They believed the information placed them in a position to make informed decisions, consequently, the participants altered their diets and improved their activity levels. Participants articulated the following:

> ‘I have made two plates (Figure 1). First plate [shows the top plate] is for food that is not healthy; a big portion of maize meal pap, many chips with little vegetables, this is wrong. The second plate [shows bottom plate] is for healthy food! Portion of vegetables, small portion of pap and different food.
>
> I also have problems with my gums, some of my teeth falls out. The yellow here shows the lost teeth. Diabetes is a problem to eyes; it affects eyesight and my body lost weight as you see me’. (Participant 1, group 1, 51 years old)

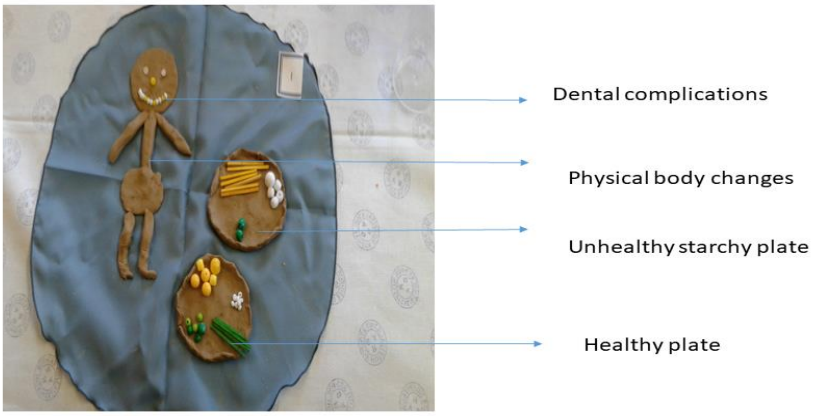

Figure 1: Positive lifestyle changes

To support this theme, other participants said:

> ‘I designed a person, she is exercising, and she stretches her arms, doing the coconut exercises, which is the exercises she loves. Exercising makes the sugar go down. She likes vegetables and fruits, for example apples, carrots, cabbage, spinach, and potatoes’ (Participant 6, group 2, 55 years old)

> ‘I was eating a lot, Sisters, but since we were taught about types of food, I reduce from eating a lot and I look for which food I can eat.’(Participant 3, group 2, 69 years old)

Ironically, they expressed that weight loss due to lifestyle changes was not readily accepted by the community.

> ‘I want to comment on weight loss because of diabetes. I was wearing size 48. Since I lost weight, I have to wear a small size. I did feel bad about it, however, I have accepted it is a disease that is in me I know now where it comes from.’(Participant 3, group 1, 51 years old)

> ‘From here I am slender, I am not in my normal body, you can see the head is big and heavy. The sugar makes my head gets dizzy and feels big when it is high’ (Participant 2, group 1, 67 years old).

Theme 2: Continuous support

The participants expressed that the continuous support offered by the CHWs was of great value to them – the participants expressed an overwhelming sense of gratitude. They acknowledged that CHWs provided important support for them to continue with behaviour change, especially considering their day-to-day struggles with diabetes. Participants shared the following:

> ‘I made a plate of food. This plate is a plate of healthy food (Figure 2). I used to vomit after my supper I was not aware that I was eating a lot of food. After continuous discussions that we have to eat small portion of food, there was changes, the vomiting stopped.
>
> The blackness here represents when I was blind, I was referred to the eye clinic where they removed the layer that made me blind.’ (Participant 3, group 1, 72 years old)

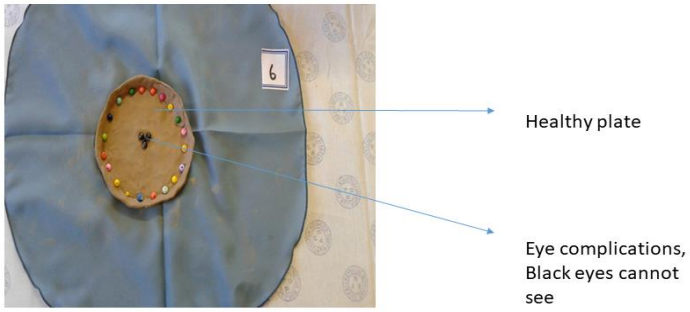

Figure 2: Continuous support

Participants acknowledged the difficulty of dealing with diabetes, therefore, they valued the interest the CHWs showed in them, as well as the time spent supporting them. Participants felt free to ask questions and express their fears and concerns to the CHWs in the study. Participants said:

> ‘I would like to express my gratitude. I would say, all these things I never take them serious, until I attended the sessions every time and I learn the importance of them. I see now that they work’ (Participant 4, group 2, 49 years old)

‘Yes Madam, I am very happy and thankful that I am more informed, as sugar is a daily problem**.** It is difficult to have sugar. Fruits are very much important and we were told during visits how to eat them.’ (Participant 4, group 1, 62 years old)

Theme 3: Improved confidence and sense of connectedness

Participants reported that their confidence with regard to the self-management of diabetes increased over time. The confidence was brought about by improvements in physical health and self-reported clinical outcomes, such as blood glucose levels and blood pressure readings. One participant articulated:

My life is different… it has changed. We were taught to eat fruits and vegetables [see the bowl] to control sugar [see Figure 3]. Here is my mug, I drink tea with it. I am a person who did not like tea, I prefer *motogo* [maize meal], it is always there, day to day. I have come down with my portion size of *motogo*. I am losing weight [see the scale] by doing some training, things I never do, I do (Participant 5, group 2, 60 years old).

Figure 3: Improved confidence and sense of connectedness with others

Another participant stated:

You know, Mama, my sugar will push up and up and eventually I would be hospitalised. It could not be controlled. I was just trying the program to see if it will work and because I have been admitted in the hospital several times because of the sugar. That is why I am saying thank you, Mama, thank you [participant very emotional, tearful]. Since I started, I have not been admitted and the last time

> when I arrived here my high blood [pressure] was also low. I applied everything that we were taught here. I was curious about the adult school asking if it was free, not knowing how much it saved our lives (Participant 6, group 2, 55 years old).

The confidence of the participants was a recurring observation in the field notes, as was the connection between the participants. The participants were very proud of their constructions and very confident in describing their way of doing things. Participants shared the following:

> ‘We were taught many things. As I am one with diabetes, that is not controlled, it goes up. They [CHWs] taught us to drink water, to eat fruits and vegetables! As I speak, my sugar is better. I know also that others also have sugar’ (Participant 2, group 2, 58 years old)

> ‘My eyes I made them to be clear I did not use a dark colour, My eyes and mouth are not dark anymore, they are bright because I am smart now because of what I know about diabetes.’ (Participant 6, group 2, 55 years old)

Participants were supportive of each other during the activity and advised and questioned one another. They shared their experiences (sad and happy) and were able to laugh and cry with each other.

Discussion

In this qualitative study, the experiences of adults who participated in the TNB Diabetes Peer Support Intervention, using the Mmogo-method®, were explored. The participants valued the intervention and acknowledged that the CHWs were an important source of support to them. Participants expressed that the intervention helped them to make positive lifestyle changes, and because they were exposed to the support continuously, their confidence in the self-management of diabetes

improved. Additionally, the intervention developed a sense of connectedness with other participants.

Positive lifestyle changes featured as an outcome of the TNB Diabetes Peer Support Intervention. A qualitative study conducted by Paul et al. (2013) in Ireland, on the experiences of participants, peer supporters and practice nurses of a diabetic peer support intervention, found similar positive effects of peer support. Those participants attended nine peer support sessions presented by trained peer supporters who had Type 2 diabetes themselves, over a two-year period. Each session covered specific aspects of diabetes. Participants in both this TNB Diabetes Peer Support Intervention and the Ireland study valued the support and comfort they received, new information that was picked up, lifestyle changes that were made, as well as improvements in self-care**.** A study by Heisler and Piette (2005), conducted in the United States of America, evaluated the feasibility and acceptability of peer support by interactive voice response amongst older adults with diabetes. Patients with poorly controlled HbA1c >8% were paired with trained peer supporters who also had diabetes, for a period of six weeks. Participants were matched based on whether they used insulin and their diabetes goals or problems. Participants had to call their partner once a week on a toll-free interactive voice response line to provide support. The study showed the participants found the support and assistance from their partners improved their motivation to follow healthy behaviour, as well as their confidence regarding diabetes self-care. This is congruent with the results of the TNB Diabetes Peer Support Intervention, namely, that gaining knowledge and taking responsibility can initiate a change in attitude and behaviour and may bring about positive lifestyle changes.

Continuous support featured as another important component of peer support. Literature acknowledges the physically and emotionally demanding nature of diabetes self-management and the need for continuous support and motivation (Warshaw et al. 2019; Carpenter, DiChiacchio & Barker 2019). Expressions of support may include listening, acceptance (Peers for Progress 2015), showing how to do something (Simmons et al. 2015) or connecting the individual to a health, social or other community resource (Tsolekile et al. 2014). Yin et al. (2015) confirm the significance of continuous support in peer support after they evaluated a peer support programme on metabolic and behavioural parameters in Chinese patients

with Type 2 diabetes. Trained peer supporters with Type 2 diabetes provided telephonic support to the patients for four years. The support consisted of a telephone call of 15–20 minutes twice a week for the first 3 months, monthly for the second 3 months and every 2 months for the next 6 months. For the other 3 years, peer supporters were asked to contact their patients every 1–2 months. The peer supporters used a checklist to review medication adherence, diet, exercise, and glucose monitoring. The authors found that, after 4 years, ongoing peer support had improved self-care behaviour, psychological health and glycaemic control. Standards of medical care in diabetes provided by authoritative bodies, such as the American Diabetes Association and the Society for Endocrinology, Metabolism and Diabetes of South Africa, include continuous monitoring and support of patients with diabetes to achieve their goals of diabetes self-management care, and this substantiates the findings of this study (American Diabetes Association 2019; SEMDSA Type 2 Diabetes Guidelines Expert Committee 2017).

Peer support improved the participants' confidence in the self-management of diabetes, and developed a sense of connectedness with other participants. A study conducted in the United States of America explored the perceptions of a peer support programme for veterans with Type 2 diabetes. The veterans participated in a 6-month intervention that paired them with a trained peer supporter with Type 2 diabetes who was also a veteran. The peer supporter phoned the veteran once a week for 6 months to promote diabetes self-management. The authors found that the veterans attached meaning to the intervention and felt connected to each other. Furthermore, they gained information through the interaction and gained confidence in their actions, because their blood glucose levels improved (Lott et al. 2019). Embuldeniya et al. (2013) conducted a qualitative synthesis of 25 studies on the experience and impact of chronic disease peer support interventions; their study confirms the findings of the participants who underwent the TNB Diabetes Peer Support Intervention. Various concepts were associated with patient experiences of peer support, such as a sense of connection with each other; finding meaning in life; isolation prompting peer support; sharing of experiences; a change in outlook, behaviour and knowledge, and empowerment. The evidence is similar to the findings of the TNB Diabetes Peer Support Intervention in terms of a change in knowledge and behaviour and a sense of connectedness with others. It is interesting that

Embuldeniya et al. (2013) also highlight the possibility of isolation occurring within peer support. This could refer to a situation of division existing between the patient and the peer supporter, due to personality differences or different backgrounds.

An unexpected finding was the response to consequences of lifestyle change reported by participants. The consequences of lifestyle change, such as weight loss, may not be readily accepted in some communities. In the African culture, a full body size may be associated with health, prosperity and beauty, and a slim body size may be associated with illness and disease (Micklesfield et al. 2013; Puoane, Tsolekile & Steyn 2010). Furthermore, obesity and overweight in women may be taken to reflect the husband's ability to take care of his wife and family (Puoane et al. 2005); full-bodied women may even be treated with more respect and dignity (Puoane et al. 2010; Puoane et al. 2005) due to their perceived ideal body size (Okop et al. 2016). Losing weight during the course of diabetes management made some of the participants feel inadequate, and they experienced disapproval from the community. The evidence emphasises the significance of cultural influences, which have to be acknowledged and addressed, as it could create a possible barrier to the self-management of diabetes.

Limitations

It is unknown whether participants' positive lifestyle changes, improved confidence and sense of connectedness with other participants would be sustained if less structured peer support had been provided. There is concern whether the experience of positive lifestyle change will be sustained over time, especially when the peer support intervention is no longer available. The generalisability of the study may be limited, due to the specific context of the study. It is interesting to note that only positive experiences were identified during the study, in spite of measures taken to encourage participants to verbalise negative experiences too.

Implications

The findings of this study augment the current literature that confirms the positive effect of diabetes peer support interventions. These positive effects may lead to participant empowerment in terms of self-care, confidence, the desire to change behaviour and, ultimately, improved diabetes self-management. The study confirms that CHWs are well positioned in the health system to provide peer support to control

and sustain diabetes self-management. However, the healthcare system needs to provide clear guidelines to CHWs with regard to remuneration, training, supervision, support and monitoring. Cultural perceptions of patients also need to be taken into consideration during the development of diabetes peer support interventions.

Conclusion

Type 2 diabetes is on the rise globally and self-management is central to diabetes care. Through a qualitative methodology of visual-based narrative inquiry, the Mmogo-method®, we explored the experiences of adults with Type 2 diabetes who had taken part in a diabetes peer support intervention.

The study revealed that patients with Type 2 diabetes in the community of Thaba Nchu in the Free State valued the TNB Diabetes Peer Support Intervention. The support and interaction of the CHWs were experienced positively and brought about improved lifestyle changes, increased self-efficacy, and connectedness with other participants. The influence of cultural factors in the self-management of Type 2 diabetes was demonstrated.

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CHAPTER 6
CONCLUSIONS, RECOMMENDATIONS AND LIMITATIONS OF THE STUDY

6.1 INTRODUCTION

This final chapter will commence with an overview of the study, after which the factual and conceptual conclusions will be presented. This will be followed by implications of the study and its limitations.

6.2 OVERVIEW OF THE STUDY

This specific focus of this study was informed by a multiphase project, guided by the United Kingdom's Medical Research Council's Complex Interventions Framework (2008), on the development of a health dialogue model for patients with T2D in LMICs. In the current study, within the feasibility phase of the larger project, the focus was on patients' identified need to utilise a developed face-to-face peer support that was developed as a self-management strategy for patients with T2D in the Free State, South Africa. The motivation for the study was that the Free State, like the rest of the world, is experiencing tremendous physical, economical and psychological adversity due to the T2D pandemic. In this respect, peer support has been recognised as a promising strategy for the self-management of T2D. The researcher viewed the study through a pragmatic lens, using the IMBP as a theoretical underpinning and to assist in conceptualising the study.

The research question of the study was as follows:

How feasible is a developed face-to-face peer support model developed for patients with T2DM in a subdistrict in the Free State province in South Africa?

The main research question unfolded four objectives, namely to:

- To synthesise the best available evidence on face-to-face peer support models for adults with T2D in LMICs (Stage 1);
- To develop a face-to-face peer support model for T2D in the Free State province (Stage 2);

- To establish the impact of the face-to-face peer support model in patients with T2D with regard to: (i) HbA1c; (ii) Blood pressure; (iii) Waist circumference; and (iv) BMI (Stage 2); and
- To determine the experiences of the patients who received the face-to-face peer support intervention (Stage 3).

A summary on the factual findings of the study will follow.

6.3 FACTUAL CONCLUSIONS

The factual conclusions in relation to each research objective will be presented in the next section.

6.3.1 To synthesise the best available evidence on face-to-face peer support models for adults with T2D in LMICs

A systematic review guided by the steps of the Cochrane Collaboration (2006) was used to critically synthesise the best available evidence on face-to-face peer support models for adults with T2D in LMICs between 2000 and 2017.

The review suggests that face-to-face individual or group-based peer support interventions were acceptable as self-management strategies in LMICs.

The review identified two common models of face-to-face peer support that were used in LMICs, namely diabetic patients and CHWs. The review, furthermore, identified essential components, which the researcher will refer to as themes and subthemes, that have to be effectively considered during the planning and implementation of the two peer support models. These themes and subthemes are the following:

- Recruitment of peer supporters
- Selection of peer supporters
- Training of peer supporters in terms of:
    - Provision of training
    - Duration of training
    - Content of training
    - Theory basis of training

- The nature of the peer intervention, in terms of:
    - Mode
    - Frequency
    - Duration
- Supervision of peer supporters (see Table 2 in Chapter 3, which explains the models further).

6.3.2 To develop a face-to-face peer support model for T2D in the Free State province (Stage 2)

The systematic review provided the best available evidence on face-to-face peer support models for adults with T2D in LMICs. This evidence guided the development of a peer support programme, which as implemented in Stage 2 (see Addendum O). The face-to-face peer support model that was developed was tailor-made, taking into consideration cultural, demographic, socio-economic, and individual variables of the community.

6.3.3 To establish the impact of the face-to-face peer support model in patients with T2DM with regard to 1) HbA1c; 2) blood pressure; 3) waist circumference; and 4) BMI

The peer support model that was developed was piloted in an intervention study (TNB Diabetes Peer Support Intervention) with a rigorous design, a cluster randomised controlled trial, in the form of a pre-and post-test study. The cluster randomised controlled trial demonstrated the feasibility of a face-to-face peer support intervention in adults with Type 2 diabetes in a semi-urban rural area in the Free State. The study resulted in significant improvement in the diastolic blood pressure of individuals (P=0.02). No differences were, however, found regarding the other variables: HbA1c (P=0.87), systolic blood pressure (P=0.13), BMI (P=0.21) and waist circumference (P=0.24).

The CHWs provided group sessions in the language understood by the patients, since the CHWs understand the culture and circumstances of the patients. A second mode of contact, home visitation, was incorporated to supplement the group sessions. Home visits enables CHWs to reinforce information, to provide support and

guidance and to reach those who could not come to the PHC due to contextual challenges.

6.3.4 To determine the experiences of the patients who received the face-to-face peer support intervention

The experiences of adults who participated in the TNB Diabetes Peer Support Intervention using the Mmogo-method®, were explored. The qualitative study added depth to the quantitative results and could lead to the development of self-management strategies that could help to manage and control the diabetes pandemic. The results show that participants valued the intervention and acknowledged that the CHWs were an important source of support for them. Participants expressed that the intervention helped them to make positive lifestyle changes, and because they were exposed to the support continuously, their confidence in the self-management of diabetes improved. Additionally, the intervention developed a sense of connectedness with other participants. The face-to-face peer support model that was developed has the potential to affect the lives of patients with T2D positively and may lead to better self-management of diabetes.

A discussion on the conceptual findings will follow.

6.4 CONCEPTUAL FINDINGS

The conceptual findings will be presented in the following section. The IMBP assisted the researcher to conceptualise the study. Figure 6.1 presents the interpretation of the conceptual framework implemented in the study.

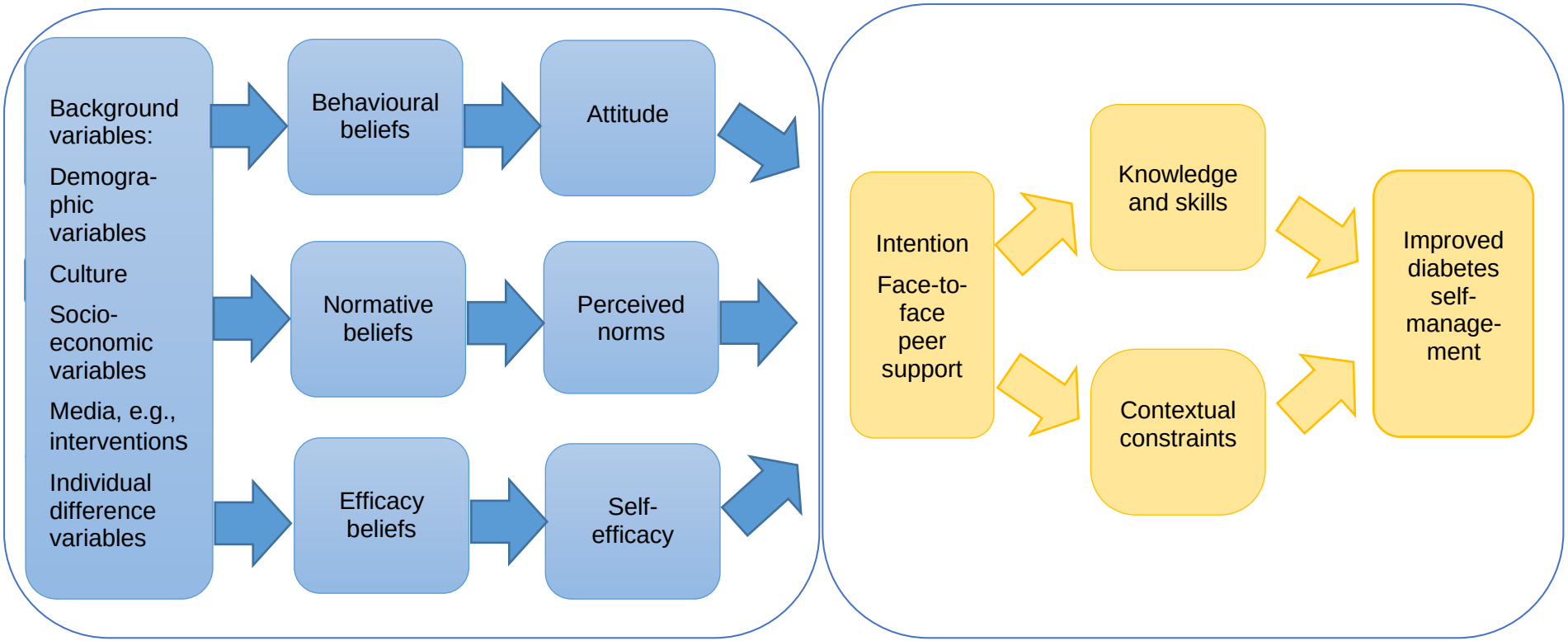

Figure 6.1: Interpretation of the integrated model of behaviour prediction

Source: Adapted from Fishbein and Yzer (2003)

Box 1 of Figure 6.1 depicts the reality of T2D. An individual's experience of and responsiveness to T2D is often significantly influenced by various background factors, such as demographics, culture, socio-economic situation, exposure to media and individual factors, such as personality and personal experience. Other factors, such as beliefs, attitudes, norms and self-efficacy beliefs, may also influence the individual. The study acknowledges the impact these background factors may have on behaviour change, therefore CHWs who originated from the same background were used to provide the face-to-face peer support intervention (Chapter 3). Box 2 explains the focus of this study: The intention to improve diabetes self-management can be strengthened by face-to-face peer support, through imparting knowledge and skills, as well as addressing possible contextual constraints.

The individuals in the study may have been influenced by two background factors. Firstly, *culture* may have affected the beliefs of individuals in the study, as they considered it important to maintain a full-sized female body size, due to the beauty and prosperity assigned to this body shape (Chapter 5). This cultural influence may have had an influence on the individuals' *beliefs, attitudes* and *perceived norms* and ultimately, *behaviour change*. This may, furthermore, account for the modest though significant findings of the study in terms of improvement in clinical outcomes (Chapter 4). Secondly, the personal experiences of individuals, in terms of improving their physical condition, may have affected their *beliefs and attitudes* and improved their levels of *knowledge and self-confidence (self-efficacy)* (Chapter 5). Other background factors may also have played a role, but they were not highlighted in the study. Based on the evidence, there may be an empirical association between these background factors and behaviour change.

Contextual constraints experienced by individuals in their daily lives, such as living long distances away from the clinic, illness and/or work commitments, were reflected in a high attrition rate, and may be regarded as barriers to behaviour performance. This finding may lead to the conclusion that there may be an empirical association between these contextual constraints and behaviour change.

6.5 IMPLICATIONS OF THE FINDINGS

The findings of the study have implications for theory, clinical practice and research in the development of face-to-face peer support for patient with T2D.

6.5.1 Implications for theory

The theoretical underpinning of the study was the IMBP, and the model enabled data to be understood in a significant way (Chapters 5, 6). The IMBP acknowledges that background factors can influence attitudes, values and intentions to change behaviour. The study reveals that background factors, such as cultural values and beliefs, influenced the ability of individuals to effectively self-manage T2D adversely (Chapter 5). At the same time, the personal experiences of individuals of the face-to-face peer support intervention, such as improvement in the physical condition, blood pressure readings and blood glucose levels due to positive lifestyle changes, improved the self-efficacy of the individuals.

According to the IMBP, it is necessary for every patient with T2D to integrate knowledge, skills and practices for effective self-management of diabetes. Knowledge, skills and practices are fundamental components of diabetes self-management and, in the study, were integrated at healthcare-facility-level in the form of group sessions, and at community level in the form of home visits (Chapter 4). The study suggests that improved self-efficacy strengthens intention to change behaviour and do diabetes self-management (Chapters 4, 5).

The findings of the intervention study highlight the complexity of T2D and its self-management, as reflected by the modest results (Chapter 4). It was informative to discover that, in diabetes self-management, “one size does not fit all”, as was displayed by the results of the systematic review (Chapter 3). Different elements needed to be integrated in a face-to-face peer support programme that was relevant to the target audience and that had to be implemented over time. A face-to-face peer support programme for adults with T2D in LMICs was, therefore, developed by the researcher (Addendum O) by considering the elements. The programme was guided by the findings of the systematic review (Chapter 3) and adapted from the IDF Peer Leader Manual (Tang & Funnell, 2015).

If patients with T2D are encouraged to repeatedly implement what they have been taught, self-efficacy may be improved. After exposure to the diabetes-related information during group sessions, patients were followed-up during home visits by the CHWs, which gave them the opportunity to reflect on their actions and to receive relevant guidance in this respect (Chapter 4). During the process, individuals with T2D were allowed to discover new ways of thinking and doing things related to diabetes self-management.

It may be suggested that the theoretical basis of training of CHWs – motivational interviewing principles – should be integrated into health dialogue in T2D. It is important to incorporate active listening, reflection, open-ended questions and a guiding style, to allow other meanings and perspectives to be realised during health dialogue (Chapter 4).

6.5.2 Implications for practice

The findings of the study suggest that the TNB Diabetes Peer Support Intervention is an acceptable form of diabetes self-management for patients with T2D in a semi-urban rural area in the Free Sate (Chapter 5). The model was led by CHWs, through both individual and group-based contact, and focused on emotional, informational, social and appraisal support (Chapter 3). The Department of Health should collaboratively advocate and develop policies that promote the appropriate implementation of the face-to-face peer support model for adults with T2D at primary healthcare level.

The study findings indicate that group sessions in peer support need to take place in environments conducive to learning in terms of privacy and physical space (Chapter 4). At facility level, provision must be made for adequate private space to conduct group sessions for diabetes self-management.

The findings of the study indicate that CHWs face various challenges in the health system (Chapter 4). As the major role-players in this model, CHWs will also need stability, through policy formulation, that addresses their place in the healthcare system with regard to occupational indemnity, development and remuneration.

This study identified the champions of face-to-face peer support as being trained CHWs. They are role models in the community who have a profound understanding

of the culture, circumstances and language of the patients in the semi-unban rural community (Chapter 3). The findings of the study (Chapters 4, 5) show that CHWs are a valuable source of support to individuals with T2D and may do more than just equipping individuals with T2D with knowledge, skills and practices for effective self-management of diabetes. They were a source of emotional, informational, social and appraisal support. CHWs have to be trained by healthcare professionals. The Department of Health may benefit from CHWs trained in diabetes-related information, as well as communication skills. The training provided to CHWs may empower CHWs with the knowledge and skill necessary to provide meaningful support to patients with T2D. Trained CHWs may experience improved confidence, motivation and self-efficacy, which will be beneficial in all spheres of their work.

6.5.3 Implications for research

The study added to the growing evidence of the significance of face-to-face peer support as a mechanism for achieving behaviour change in diabetes self-management. There is a critical need for ongoing research on peer support in T2D, especially in LMICs, where resources are limited.

Contextual constraints identified in the study (Chapter 4), such as living long distances from the clinic, illness and/or work pressures, were self-reported reasons for high attrition rates of group sessions. Research may be conducted in the future to establish whether a relationship exists between contextual barriers and effective diabetes self-management.

In addition to culture and personal experience, no other background factors were identified by the study as affecting effective self-management of diabetes (Chapters 4, 5). It would be enlightening if future research could pursue the relationship the other factors may have on effective diabetes self-management.

6.6 LIMITATIONS OF THE STUDY

The face-to-face peer support model was developed specifically for the context of LMICs, like South Africa, and a semi-urban rural area. LMICs have limited infrastructure and resources, and application of the face-to-face peer support model to other contexts will have to consider the availability of infrastructure and resources.

Due to dedicated follow-up of participants and CHWs, and the structured nature of the programme, the workload of the intervention was high. This should be taken into consideration during the planning and implementation of a peer support intervention. However, the programme may become self-sustainable in the long run, requiring less supervision and support.

There was a high attrition rate associated with face-to-face peer support, but this was mitigated by a second mode of contact, home visits, to make sure that emotional, social, informational and appraisal support was provided.

The study period was relatively short, due to time and budgetary constraints, and this may have limited the observation of other significant changes in variables. A longer study period is recommended for future research.

The effect of the face-to-face peer support intervention on diabetes-related knowledge was not assessed in the CHWs. Additionally, only the experiences of patients forming part of the TBN Diabetes Peer Support Intervention were explored, and not the experiences of the CHWs themselves. It is possible that data that was not explored could have added a richer dimension to the study.

6.7 CONCLUSIONS

At this stage, it is possible to conclude that the study succeeded in answering the research question and, in the course of doing so, it contributed to the existing body of research. The research question of the study related to the *feasibility of a developed face-to-face peer support model developed for patients with T2D in a subdistrict in the Free State province of South Africa.* Based on the findings and conclusions of the study, it is reasonable to state that the developed face-to-face peer support model, which was tailor-made and informed theoretically, for patients with T2D in a subdistrict in the Free State province in South Africa, is feasible and acceptable. The study was able to close the knowledge gap identified in Chapter 1 by providing a better understanding of face-to-face peer support models for T2D.

The findings of the study has implications for theory, clinical practice and research, such as the possible adoption of the face-to-face peer support model in clinical practice and the adequacy of the IMBP for representing the complexities of self-management of T2D. It can only be hoped that the findings of the study

demonstrated the powerful impact that face-to-face peer support may have on T2D, and even other NCDs.

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ADDENDUM A:

CONTRACT WITH THE UNIVERSITY OF FREE STATE

POST-GRADUATE STUDENT AND SUPERVISOR AGREEMENT:
FACULTY OF HEALTH SCIENCES
UNIVERSITY OF THE FREE STATE

In a context of academic freedom and within a framework of individual autonomy and the pursuit of knowledge, this agreement is written in the belief that there is a reciprocal relationship and mutual accountability between supervisor and student.

(With acknowledgement to the University of the Witwatersrand:
Statement of Principles for Postgraduate Supervision)

The supervisor and the student will:

1. Establish agreed roles and clear processes to be maintained by both parties. In the case of joint supervision, the role of every participant must be clarified.
2. Meet regularly and as frequently as is reasonable to ensure steady progress towards the completion of the proposal, research report, dissertation or thesis.
3. Keep appointments, be punctual and respond timeously to messages, and keep one another informed of any planned vacations or absences as well as changes in his/her personal circumstances that might impact on the work schedule. Unplanned absences or delays should be discussed as soon as possible and arrangements should be made to catch up lost time.
4. Ensure that research on animal or human subjects is conducted according to the procedures and the requirements of, and will prepare progress reports for the attention of the relevant University Ethics committee.

ADDENDUM B:

LINK TO AUTHOR GUIDELINES

ARTICLE 1

https://bmcpublichealth.biomedcentral.com/submission-guidelines/preparing-your-manuscript

ARTICLE 2

https://journals.co.za/upload/Guidelines_for_Authors/m_jemdsa_auth.pdf

ARTICLE 3

https://journals.co.za/upload/Guidelines_for_Authors/health_auth.pdf

ADDENDUM C

PERMISSION FROM HEALTH SCIENCES RESEARCH AND ETHICS COMMITTEE

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

UFS·UV
HEALTH SCIENCES
GESONDHEIDSWETENSKAPPE

Health Sciences Research Ethics Committee

09-Oct-2019

Dear Mrs Melanie Pienaar

Ethics Number: UFS-HSD2017/1546

Ethics Clearance: A face-to-face peer support model for patients with type 2 Diabetes

Principal Investigator: Mrs Melanie Pienaar

Department: School of Nursing Department (Bloemfontein Campus)

SUBSEQUENT SUBMISSION APPROVED

With reference to your recent submission for ethical clearance from the Health Sciences Research Ethics Committee. I am pleased to inform you on behalf of the HSREC that you have been granted ethical clearance for your request as stipulated below:

Minor Amendment: Title change from "A peer support model for patients with Type 2 Diabetes" to "A face-to-face peer support model for patients with type 2 Diabetes"

A description of the health literacy calculation and blood pressure classification is added and it describes the analysis of data

Health literacy test will be omitted post-testing

The HSREC functions in compliance with, but not limited to, the following documents and guidelines: The SA National Health Act. No. 61 of 2003; Ethics in Health Research: Principles, Structures and Processes (2015); SA GCP(2006); Declaration of Helsinki; The Belmont Report; The US Office of Human Research Protections 45 CFR 461 (for non-exempt research with human participants conducted or supported by the US Department of Health and Human Services- (HHS), 21 CFR 50, 21 CFR 56; CIOMS; ICH-GCP-E6 Sections 1-4; The International Conference on Harmonization and Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH Tripartite), Guidelines of the SA Medicines Control Council as well as Laws and Regulations with regard to the Control of Medicines, Constitution of the HSREC of the Faculty of Health Sciences.

For any questions or concerns, please feel free to contact HSREC Administration: 051-4017794/5 or email EthicsFHS@ufs.ac.za.

Thank you for submitting this request for ethical clearance and we wish you continued success with your research.

Yours Sincerely

Dr. SM Le Grange
Chair : Health Sciences Research Ethics Committee

Health Sciences Research Ethics Committee
Office of the Dean: Health Sciences
T: +27 (0)51 401 7795/7794 | E: ethicsfhs@ufs.ac.za
IRB 00006240; REC 230408-011; IORG0005187; FWA00012784
Block D, Dean's Division, Room D104 | P.O. Box/Posbus 339 (Internal Post Box G40) | Bloemfontein 9300 | South Africa
www.ufs.ac.za

ADDENDUM D

HIGHEST QUALIFICATIONS OF EXPERTS IN THE SYSTEMATIC REVIEW

1. Dr Marianne Reid

   Institution: University of Free State

   Highest qualification: PhD Nursing

2. Dr Cynthia Spies

   Institution: University of Free State

   Highest qualification: PhD Nursing

3. Ms Ega Janse Van Rensburg-Bonthuyzen

   Institution: University of Free State

   Highest qualification: MSocSc

ADDENDUM E

CRITICAL APPRAISAL REFERENCES

- Critical Appraisal Skills Programme (CASP). 2018a. CASP Checklist: 10 questions to make sense of a Systematic Review. https://casp-uk.net/wp-content/uploads/2018/01/CASP-Systematic-Review-Checklist_2018.pdf.

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ADDENDUM F

CHARACTERISTICS OF STUDIES INCLUDED IN THE SYSTEMATIC REVIEW

Additional file 1: Characteristics of studies included in the study

STUDY AUTHOR YEAR COUNTRY AND DESIGN	AIM OF STUDY AND OUTCOMES MEASURED	SETTING AND STUDY POPU-LATION	QUESTIONS RELATED TO THE REVIEW QUESTION						
			MODEL OF PEER SUPPORT	PEER SELECTION AND RE-CRUITMENT	PEER TRAINING AND THEORY BASIS	PEER INTER-VENTION AND DURATION	PEER SUPPORT SUPERVISION	FINDINGS OF THE STUDY	QUALITY ASSESS-MENT
1. Peimani et al. (2018) [30] Iran Randomised control trial	**Aim:** To assess the effectiveness of a peer support intervention **Outcomes measured:** 1) improve-ment in self-care activities 2) reported self-efficacy 3) quality of life 4) clinical outcomes: HbA1c and body mass index	**Setting:** A diabetic speciality clinic **Study popu-lation**: 200 T2DM patients aged 25-75; in inter-vention n=100/100 and control n=100/100 pre- and post- inter-vention respective-ly	Delivered by diabetic patient	- 10 diabetic patients nominated by physicians and diabetes educators - based on specific criteria, such as knowledge of diabetes control, interpersonal skills, self-motivation and problem-solving skills	- attended three-day course - structured, buzz-group interactive course - conducted by research team - content of training included developing facilitation, active listening and problem-solving skills, providing emotional support, facilitating behaviour change, building boundaries and dealing with difficult situations	- monthly face-to-face group-based session - combined with weekly telephone support - each peer assigned to 10 patients - intervention duration six months	- group meetings were recorded - recordings provided to research team - peer supporters had weekly telephone contact with research team to provide support	1) Increase in mean self-care activities in peer support (P<0.001) **2) Mean self-efficacy** reduced in peer support (P<0.001) 3) Increase in mean quality of life in peer support group (P<0.001) 4) Decrease in mean **HbA1c value** in peer support group (P=0.045)	Good quality rating

					- theory basis for training not reported				
2. Sreedevi et al. (2017) [31] India An open parallel three-armed randomised control trial (feasibility study)	**Aim:** To study the feasibility and effect of yoga and peer support on glycaemic outcomes, pharmacolo-gical adherence and anthropo-metric measures **Outcomes measured:** 1) fasting plasma glucose (FPG) 2) HbA1c 3) quality of life 4) pharmaco-logical adherence 5) body mass index 6) waist-hip ratio 7) blood pressure	**Setting:** A rural area at a health-training centre **Study popu-lation**: 124 T2DM women aged 30–65; random-ised into yoga 41/32; peer inter-vention 42/32, and control groups 41/35 pre- and post-inter-vention respective-ly	Delivered by diabetic patient	- three diabetics identified and recruited from community - based on specific criteria, such as having T2DM ≥1 year; adherent to treatment; committed and capacity for training	- two-day training - by specialists - content of training included developing communication skills, diabetes-specific information on diet, medication, exercise and dealing with the illness - theory basis for training not reported	- weekly face-to-face individual session - a follow-up telephone call the same week - one peer assigned to 13-14 patients - intervention duration three months	- not reported	1) **FPG** decreased in yoga group (CI 34.5 – 44) compared to peer (CI 37.6 – 46.1) and control group (CI-31.6 – 28) 2) Yoga group only decreased HbA1c (CI -0.85 – 0.34) 3) Quality of life not reported on 4) **Adherence** score increased in all arms 5**) Body mass index** increased in all arms 6) A mean fall **in waist-hip ratio** in peer and control groups at .04 and 0.03 respectively 7) Yoga group decreased in **diastolic blood pressure** (CI -0.64-0.77) 8) Total **cholesterol** levels in peer group decreased by 5 mg% (95% CI -	Good quality rating

	8) total cholesterol							15, 5.1)	
3. Paz-Pacheco et al. (2017) [33] Philippines Prospective education-intervention trial	**Aim:** To assess the effectiveness of community-based diabetes self-management education (DSME) in a rural agricultural town **Outcomes measured:** 1) body mass index 2) waist-hip ratio 3) blood pressure 4) HbA1c 5) FBG 6) cholesterol 7) exercise 8) foot examinations 9) cigarette smoking, illicit drug use and alcohol consumption	**Setting:** Rural town **Study popu-lation:** 155 T2DM patients from 19 random-ised villages; 85/72 in DSME group and 70/52 in control group pre- and post-inter-vention respective-ly	- Delivered by diabetic patient	- 14 diabetic patients recruited from participants - no criteria applied, only willingness to be trained - after training, they had to demonstrate in return	- two-day workshop - conducted by endocrinologists - content of peer training included overview of diabetes mellitus, diabetes and exercise, diabetes and diet, pharmacologic al treatments and complications of diabetes - theory basis for training not reported	- weekly face-to-face group-based session - six to 15 participants per group - intervention duration four weeks only - data repeated at three and six months.	Supervision - not reported	1) No body mass index changes 2) **Waist-hip ratio** for women higher in DSME group than for usual care at third month (*p*=0.02) 3) **Diastolic blood pressure**, no significant changes 4) DSME group had lower median **HbA1C levels** at the third (P=0.03) and sixth months (P=0.01) **5) FBG levels** similar for both groups at all points **6) Total cholesterol levels**, decrease in third month in DSME group compared with usual care group (P=0.0002), as well as on the sixth month (P=0.0002) 7) R**egular exercise** in DSME group was comparable with	Moderate quality rating

	10) medication adherence							usual care group by third and sixth months, at baseline (34.94 versus 51.43%, P=0.040) 8) In both groups, **foot examination** increased by sixth month compared to baseline (from 24.10 to 75.81% in DSME group, and from 41.43 to 85.11% in usual care group). 9) Groups were similar regarding smoking cigarettes, consuming alcohol and using illicit drugs 10) Medication compliance similar in both groups	
4. Debussche et al. (2018) [34] Mali Open label randomised controlled	**Aim:** To evaluate the effective-ness of peer-led self-management education in improving blood glucose control in patients with T2DM	**Setting:** Two secondary health centres **Study popu-lation:** 151 T2DM patients	Delivered by diabetic patient	- 10 diabetic patients recruited from local diabetes association - based on having diabetes, living in the area, regular checks with a physician,	- initial four-day training - not stated by whom - content of peer training included focus on cardiovascular risk management, food intake,	- face-to-face group sessions - three courses over one year - four themes per course, offered over three months (months 1–3, 7–9, and 10–12) - content	Supervision not reported	1) **HbA1c levels more favourable** in intervention (P=0.006) 2) **Body mass index more** favourable in intervention (P=0.0005) 3) **Waist circumference** more favourable in	Good quality rating

trial	**Outcomes measured**: 1) HbA1c 2) weight and body mass index 3) waist circumference 4) systolic and diastolic blood pressure 5) anti-diabetic treatment 6) knowledge score 7) dietary practices	aged 30-80; in inter-vention group 76/70 and control group 75/70 pre- and post-inter-vention respective-ly		volunteering for educational sessions, and being fluent in both local languages - patients evaluated before selection, only five were chosen for the project	exercise, blood glucose and insulin management, taking into account individual, social and cultural context - training based an empowerment-based approach derived from socio-constructivist theory	tailored for patients' literacy level and Mali culture - four to 10 participants per session		intervention (P=0.0003) 4) Changes in **systolic pressure** between intervention and control group was P=0.003. Changes in diastolic pressure between intervention and control group was P=0.36 5) Proportion of patients **receiving insulin** decreased in the intervention group (P=0.0003) 6) Changes in **knowledge levels** between intervention and control group was P=0.17 7) No positive change in **diet diversity score**	
5. Sazlina et al. (2015) [35,52] Malaysia A three-arm	**Aim:** To evaluate the effective-ness of personalised feedback (PF) about physical activity patterns alone or in combination	**Setting:** A primary healthcare clinic **Study popu-lation**: 69 T2DM	Delivered by diabetic patients	- clinic staff personally contacted potential peers telephon-ically - notices displayed at clinic - specific	- 2-day training - not stated by whom - content of training included diabetes self-management, physical activity, stress	- three face-to-face individual sessions and - three telephone sessions - intervention duration 12 weeks - follow-up at	-two fortnightly and - two-monthly debriefing meetings - held over the 12 weeks, - to facilitate and support the	1) PS group showed greater daily **pedometer readings** than PF group and control group (P=0.001) 2) PS group had greater improvement in weekly duration (P<0.001) and	Good quality rating

randomised controlled trial	with peer support (PS), in addition to usual diabetes care in improving physical activity levels in sedentary older Malays with T2DM **Outcomes measured:** 1) physical activity level 2) subjective measure of physical activity 3) HbA1c; BP; body compo-sition, i.e. weight; body mass, waist circumference, body fat percentage and lipid profiles 4) functional status (cardio-respiratory fitness and balance) 5) quality of life 6) psycho-	patients ≥60 years of age; random-ised in PF group 23/19; PS group 23/17 and control group 23/16 pre- and post-inter-vention respective-ly		criteria applied: must volunteer; have T2DM ≥5 years; lived in same community; engaged in regular physical activity; HbA1c of 8%; owns a mobile phone; willing to attend training	management and communication - the training intervention incorporated constructs of social cognitive theory	24 and 36 weeks	peer mentor - ongoing supervision at monthly clinic visits with their peers, where feedback was provided to peer mentors on their performance and possible points of improvement	frequency (P<0.001) of physical activity 3) No changes in HbA1c, weight, body mass index and waist circumference. Body fat reduced more in PS than PF and control group (P=0.004) 4-6) PS showed greater improvement in the 6-min walk test (P<0.001), physical activity scale for elderly (P=0.003) and social support from friends (P=0.032) than PF and control groups	

	social well-being								
6. Mash et al. (2014) [36,53] Cape Town Pragmatic cluster randomised controlled trial	**Aim:** To evaluate the effective-ness of group diabetes education in underserved communities in South Africa **Outcomes measured:** 1) improved self-care activities 2) 1% HbA1c reduction 3) 5% weight loss 4) improved locus of control 5) self-efficacy 6) mean weight loss 7) blood pressure 8) waist circumference 9) mean total cholesterol 10) quality of	**Setting:** 34 Public sector community health centres **Study popu-lation**: 1 570 T2D patients recruited, 710/391 in inter-vention arm from 17 health centres, 860/475 in control arm from 17 health centres in pre- and post- inter-vention respective-ly	Delivered by CHWs	- CHWs with secondary school education were recruited from district health service	- initially trained in four- day workshop - training conducted by family physician and nurse diabetic educator - a further two-day workshop two months later - content included understanding diabetes**, l**iving a healthy lifestyle, understanding the medication and preventing complications - education and activities adapted to local context - training based on motivational interviewing guidelines	- monthly face-to-face group sessions **-** 10-15 patients per group **-** intervention duration six months **-** follow-up 12 months	**-** health promoters were evaluated by the researcher at each health centre at least twice and gave feedback to the health promoters after the sessions	1) No differences in **self-care activities,** 2) **HbA1c level** by 1% (CI 0.64–1.73) or 3) in achievement of **5% weight loss** (CI 0.50–1.24) 4) No significant differences in **locus of control,** 5) self-efficacy, 6) weight, **7)** s**ignificant decrease in mean systolic blood pressure** (-4.65 mmHg, 95% CI 9.18 to -0.12; P=0.04) **and diastolic blood pressure** (-3.30 mmHg, 95% CI -5.35 to -1.26; P=0.002) in intervention group 8) No significant differences in waist circumference, 9) total cholesterol or	Good quality rating

	life							10) quality of life	
7. Less et al. (2010) [37] Jamaica Prospective cohort study	**Aim:** To evaluate the effectiveness of lay diabetes facilitators to increase knowledge and improve control in persons with diabetes **Outcomes measured**: 1) Improvement in HbA1c	**Setting:** 16 health centres **Study popu-lation:** 318 T2DM patients aged 25–75 years; recruited from 16 health centres; 8 centres inter-vention group, 8 centres control group, n=159 inter-vention; n=159 control group	Delivered by CHWs	- not reported - after training, 24 achieved >90% and qualified for this study	- 42 CHWs were trained for six hours - not stated by whom **-** content included basic knowledge on diabetes, management, complications and self-monitoring - CHWs retrained in a two-hour diabetes session at baseline and six months - theory basis for training not reported	**-** three-monthly face-to-face group sessions **and** **-** three-monthly home-visits - 10 -12 participants per group - intervention duration six months - CHW used three patient self-monitoring forms**:** personal eating tracker; physical activity log; and blood glucose monitoring form - CHW reviewed these forms at each session	Not reported	1) Mean HbA1c for both groups similar at baseline (7.9% versus 8.0%; P>0.58). At 6 months, intervention group reduced HbA1c by 0.6% while the comparison group had an increase of 0.6% (P<0.001)	Good quality rating
8. Dasappa et al. (2016) [32]	**Aim:** Assessing the effectiveness of yoga, pranayama, and sudarshan kriya in	**Setting:** Four urban slums	Delivered by CHWs	- no criteria reported - four local women recruited from same area to	- CHWs had 81 hours of training - content included 56 hours on leadership	- Weekly face-to-face individual intervention - They filled in follow-up information	Not reported	1**) Mean HbA1c** decreased in intervention and non-intervention group, insignificantly, due to short duration of	Good quality rating

India Non-randomised controlled trial	community-based management of diabetes mellitus **Outcomes measured:** 1) Hb1Ac 2) systolic and diastolic blood pressure 3) adherence to medication 4) changes in lifestyle	**Study population**: 109 diabetes patients from four slums, mean age of 52, 94%; 52/40 in intervention (agreed to learn and practice yoga); remaining 57 assigned to non-intervention group		implement the project	qualities and other soft skills - 10 hours basics of diabetes and hypertension - 15 hours on measuring blood sugar, blood pressure and weight - not reported who conducted training - theory basis for training not reported	sheets that included glucose random blood sugar, blood pressure, weight, physical activity, dietary practices, adherence to medications by pill count, smoking, and alcohol consumption - CHWs made a total of six visits during the study - The intervention duration was **40 days**		intervention 2) Significant change in **systolic and diastolic blood pressure** **≤**140/90 (x2 = 10.635, P<0.005) between two groups 3) **adherence to metformin** (P<0.005), and other medication improved (P<0.005) 4) **vegetable consumption** improved (P<0.005); fruit consumption improved (P<0.005); salty food consumption reduced (P<0.005); bakery food consumption reduced (P<0.005) and fried food consumption reduced (P<0.005)	
9. Do Valle Nascimento,	**Aim:** To examine the feasibility,	**Setting:** A primary care health	Delivered by CHWs	- CHWs recruited from residents of	- 19 CHWs participated in 32 hours of	- monthly face-to-face individual home	- CHWs were evaluated at home visits by the research	1) **PACIC improved** (P <.001)	Good quality rating

et al. (2017) [38] Brazil Single group, pre-post study	acceptability, and outcomes of training community health agents in motivational interviewing-based counselling for patients with poorly controlled diabetes in a primary care centre in São Paulo, Brazil **Outcomes measured:** 1) participants' report on quality of diabetes care, measured by the Patient Assessment of Chronic Illness Care (PACIC) 2) con-sumption of fruit and vegetables 3) physical activity 4) diabetic medication adherence	unit **Study popu-lation:** 57 T2DM patients aged <75 years. 52 patients completed the study		the communities - no formal training required besides some secondary education	initial training - led by Brazilian trainers trained by research members - CHWs **had four hours a** month additional **booster training and support** over six-month intervention period. - content included 1) identify personal diabetes self-management goals 2) **formulate specific short-term** action plans to reach goals - motivational interviewing-based theory	visits - six-month intervention duration	team	2) Significant increase in consumption **of fruits and vegetables** (P<.001), 3) in **physical activity** (P=.001), and 4) in diabetes medication adherence (P=.002). 5) insignificant decreases in consumption of fat foods (P=.402) or sweets (P=.436). 6) six-month **A1c levels 0.34% points** lower than at baseline (P=.08) 7) improved mean LDL (P=.005) and 8) improved **triglyceride levels** (P=.002)	

	5) con-sumption of fat and sweets 6) A1C 7) cholesterol levels 8) triglyceride levels								
10. Micikas et al. (2012) [39] Guatemala A single group, pre-test post-test design	**Aim:** To determine if a structured, community-led diabetes self-management intervention could be implemented successfully and whether the inter-vention could improve selected health outcomes for diabetic patients **Outcomes measured:** 1) changes in HgA1c 2) body mass index 3) health	**Setting:** Two rural primary care clinics **Study popu-lation:** 52/52 T2DM patients ≥18 years partici-pated in pre- and post-test surveys	Delivered by CHWs	-not reported - after training and evaluation, the team **selected 8 CHWs** for the programme	- 21 CHWs participated in one week of daily "train-the-trainer" sessions - content focused on the diabetes disease process and principles of management - the selected CHWs had an **additional** week of training. - motivational interviewing and health behaviour-based theory	- weekly face-to-face group meeting -15-20 patients per group - CHWs also conducted weekly home visits and - pre-consultations at clinic - intervention duration four months	Not reported	1) the mean HgA1c for sample decreased to 8.9%, a statistically significant decrease (P=.001) 2) no significant change in mean body mass index 3) results from health beliefs and practices survey were mainly non-significant	Moderate quality rating

	beliefs and practices of participating diabetic patients								
11. Assah et al. (2015) [40] Cameroon Non-ran-domised control trial	**Aim:** To examine the effectiveness of a community-based multi-level peer support intervention **Outcomes measured:** 1) Improved glycaemic levels 2) blood pressure 3) lipids in patients with T2DM 4) diabetes self-care behaviour	**Setting:** National Obesity Centre, at a hospital **Study popu-lation**: 100/96 T2DM patients in inter-vention arm and 100/96 were recruited into the control arm in pre- and post- inter-vention respective-ly	Delivered by diabetic patient	Diabetic patients recruited based on better glycaemic control, more compliant with clinic visits and experiential knowledge on diabetes –they had to volunteer	- two- day **training** - content included building and reinforcing knowledge on diabetes, training on communication skills, effective group and face-to-face meetings, and use of personal history in peer support. - theory base for training not reported	- monthly face-to-face group meetings - 8-10 participants per group, 10 groups - also, monthly individual sessions and phone calls - intervention duration six months	Not reported	1) significant reduction in **HbA1c** in intervention group compared with controls (P <0.001) 2) significant reductions in **diastolic pressure** (P<0.001) 3) Significant reductions **in cholesterol** (P<0.001), HDL (P<0.001), BMI (P<0.001) 4) diabetes self-care behaviours (general diet, exercise, blood glucose testing and foot score) improved significantly (P<0.001)	Good quality rating
12. Alaofè et al. (2017) [41]	**Aim:** To critically appraise evidence regarding the effectiveness	**Setting:** LMICs	Delivered by CHWs	- only three of nine studies reported on selection criteria,	- only three studies reported training duration, ranging	- seven of nine studies reported face-to-face interventions - two studies	Not reported in any study	- 10 studies were included (four pre- and post-studies, two randomised controlled trials, two cohort studies,	Moderate quality rating

Developing countries Systematic review	of CHW interventions for prevention and management of T2DM in LMICs **Outcomes measured:** Outcomes that might result from CHW-led T2DM care or prevention interventions	**Study popu-lation:** **n=6 297** studies after filtering: title and abstract, inclusion and exclusion criteria and full text analysis. **n=10 articles** included: 2 prevention and 8 manage-ment studies **Studies included** Random-ised controlled, cross-sectional, cohort, controlled before-and-after and case-control studies published from		ranging from primary education, high school education, leadership qualities, bilingualism, community experience, an entrance examination and years of training	between six hours, four weeks and 14 weeks respectively - five studies reported training content: diabetes lifestyle modifications, medication awareness and prevention of complications - none of the studies reported who provided the training - theory base for training not reported in any study	did not report the nature of the intervention – three studies reported conducting either group or individual sessions - four studies reported a combination of group and individual peer support intervention - intervention period ranged from three to six months, with varying follow-up periods		one cross-sectional study, and one case-control study) -positive outcomes reported in seven of 10 studies. These outcomes included increased knowledge of T2DM symptoms and prevention measures, increased adoption of treatment seeking and prevention measures, increased medication adherence, and improved fasting blood sugar, glycated haemoglobin, and body mass index. Three studies showed no significant outcomes	

		inception to May 31, 2017							

ADDENDUM G

PERMISSION FROM FREE STATE DEPARTMENT OF HEALTH

health
Department of Health
FREE STATE PROVINCE

26 March 2018

Mrs. M Pienaar
School of Nursing (Bloemfontein Campus)
BFN

Dear Mrs. M Pienaar

Subject: A peer support model for patients with Type 2 Diabetes.

- Please ensure that you read the whole document, Permission is hereby granted for the above – mentioned research on the following conditions:
- Participation in the study must be voluntary.
- A written consent by each participant must be obtained.
- Serious Adverse events to be reported to the Free State department of health and/ or termination of the study
- Ascertain that your data collection exercise neither interferes with the day to day running of the J Mokhothu, Mafane, Mokwena, M Tau, Thaba Nchu and TS Mahloko Clinic nor the performance of duties by the respondents or health care workers.
- Confidentiality of information will be ensured and please do not obtain information regarding the identity of the participants.
- **Research results and a complete report should be made available to the Free State Department of Health on completion of the study (a hard copy plus a soft copy).**
- Progress report must be presented not later than one year after approval of the project to the Ethics Committee of the University of Free State and to Free State Department of Health.
- Any amendments, extension or other modifications to the protocol or investigators must be submitted to the Ethics Committee of the University of Free State and to Free State Department of Health.
- **Conditions stated in your Ethical Approval letter should be adhered to and a final copy of the Ethics Clearance Certificate should be submitted to** sebeelats@fshealth.gov.za **before you commence with the study**
- No financial liability will be placed on the Free State Department of Health
- Please discuss your study with the institution manager/CEOs on commencement for logistical arrangements
- Department of Health to be fully indemnified from any harm that participants and staff experiences in the study
- Researchers will be required to enter in to a formal agreement with the Free State department of health regulating and formalizing the research relationship (document will follow)
- You are encouraged to present your study findings/results at the Free State Provincial health research day
- Future research will only be granted permission if correct procedures are followed see http://nhrd.hst.org.za

Trust you find the above in order.
Kind Regards

Dr D Motau
HEAD: HEALTH
Date: 29/03/18

Head : Health
PO Box 227, Bloemfotein, 9300
4th Floor, Executive Suite, Bophelo House, cnr Maitland and, Harvey Road, Bloemfotein
Tel: (051) 408 1646 Fax: (051) 408 1556 e-mail:khusemj@fshealth.gov.za@fshealth.gov.za/chikobvup@fshealth.gov.za

ADDENDUM H

PATIENT QUESTIONNAIRE ON DEMOGRAPHICS

AND QUALITY OF LIFE (INTERVENTION STUDY)

ADULT DIABETIC PATIENT QUESTIONNAIRE

Only interview patients: That have signed consent
Older than 18 years
Type II Diabetes
Whose 1st language is Sesotho

Interview number: _____

Instructions - Circle the appropriate number or write your answer in the space provided.

A. Name of facility .....

B. Date questionnaire is completed ..... / ..... / ..... (dd/mm/yy)

PART I: RESPONDENT PROFILE

Demographic Information

1. Note respondent's gender

1	Male
2	Female

2. How old are you in years? _____

3. What is your highest level of education?

1	Some high school
2	Completed high school
3	Certificate
4	Diploma
5	Other (Specify). _____

Quality of Life

In the following section I want to ask about your GENERAL state of health.
Please indicate which statement best describes your own state of health **TODAY.**

4. Do you have any problems walking about?

1	No
2	Yes

5. Do you have problems with selfcare such as dressing and washing?

1	No
2	Yes

6. Do you have problems with usual activities such as work, study, housework, family or leisure activities?

1	No
2	Yes

7. Are you happy most days of the week?

1	No
2	Yes
3	Unsure

Medical History

8. How long ago were you diagnosed with Diabetes?
_____ Years

9. Are you taking medication for any other illnesses?

1	Yes
2	No

10. If yes, what illnesses are you treated for?

_____
_____
_____
_____
_____
_____
_____
_____

PART II: MEASUREMENTS

Pre-test date: _____

1. HbA1c: _____
2. Blood pressure: _____
3. Weight: _____
4. Height: _____
5. Body mass index: _____

ADDENDUM I

SESOTHO HEALTH LITERACY TOOL (INTERVENTION STUDY)

1 If I break my leg, I must go to the a) Clinic b) Hospital c) I don't know	Ha nka robeha leoto, ke tlameha ho ya a) Tliliniking b) Sepetlele c) Ha ke tsebe
2 If my brother who stays with me has TB, I must a) do nothing b) go to the clinic for TB testing c) I don't know	Ha moholwane wa ka ya dulang le nna a na le TB, ke tlameha ho a) Sa etse letho b) Ho ya tliliniking bakeng sa diteko tsa TB c) Ha ke tsebe

 = 1 standard cup

Note: 1 teaspoon of sugar = 5ml or 4.2g

1 cup of sugar = 250ml or 212g

3 Look at the sugar measurements. A cup of sugar equals: a) 5 ml b) 250 ml	Sheba ditekanyetso tsa tswekere.Kopi ya tswekere e lekana le a) 5 ml b) 250 ml

c) I don't know	c) Ha ke tsebe
4 Your friend is overweight. She does not have money. Appropriate advice you can give her to lose weight is to:	Motswalle wa hao o nonne. Ha a na tjhelete. Keletso e tshwanelehang eo o ka mo fang yona ho theola boima ba mmele ke
a) To go to a gym b) Take long fast walks c) I don't know	a) Ho lefa ho ya boikwetlisong b) Ho tsamaya ka potlako nako e telele c) Ha ke tsebe
5 A person taking a medication for the first time and presents with a skin rash must	Motho a nwang moriana lekgetlo la pele ha a ba le lekgopo o tlameha ho
a) Finish the medication b) Go back to doctor/clinic c) I don't know	a) Ho qeta moriana b) Ho kgutlela ngakeng/ tliliniking c) Ha ke tsebe

PAIN TABLETS

Per Tablet: paracetamol 500mg;

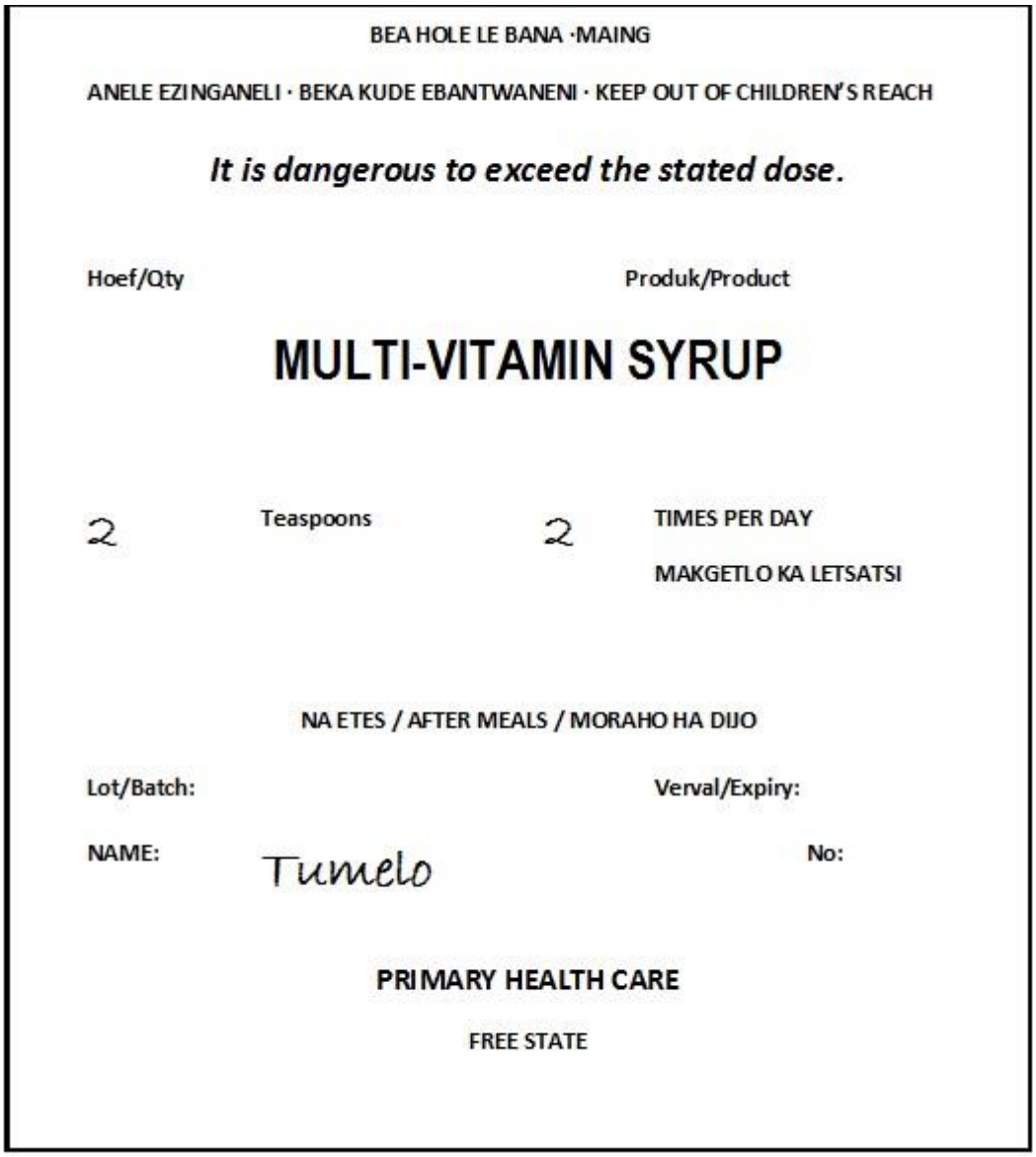
Potassium sorbate 0.12% m/m Sugar free

Warning: Do not use continuously for longer than 7 days (adults) or 5 days (children) without consulting your doctor. Store below 25 C in a well-closed container protected from light and air.

KEEP OUT OF REACH OF CHILDREN

6 You have been taking pain pills for 7 days and still have pain. Look at the instructions on the pain tablet label and decide what you have to do:	O nwele dipilisi tsa mahlaba matsatsi a 7 empa o ntse o opelwa. Sheba ditaelo tsena mme o etse qeto ka seo o tlamehang ho se etsa
a) Take 2 pills b) Go to the doctor/clinic	a) Enwa dipilisi tse 2 b) E ya ngakeng/tliliking

c I don't know	c) Ha ke tsebe



7 Look at the instruction on medication bottle. How many times does Tumelo have to take his multi vitamin syrup a day?	Sheba ditaelo tse botlolong ya moriana. Tumelo o tlameha ho nwa moriana wa di-aha mmele ha kae ka letsatsi?
a) 2 times per day	a) 2 ka letsatsi
b) 4 times per day	b) 4 ka letsatsi
c) I don't know	c) Ha ke tsebe

8 When we read the following word, which option is best associated with the word:

TB

a) Cough
b) Weight gain
c) I don't know

Ha re bala mantswe a latelang, kgetho nyallanang le lentswe leo ke e fe

TB

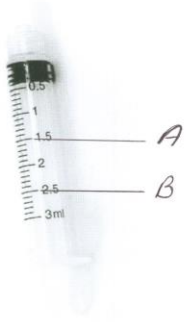
a) Ho hohlola
b) Ho eketseha mmele
c) Ha ke tsebe

9 If you take your first dosage of pain medication at 8 o'çlock and the nurse tells you to take the pain medication every 6 hours, when can you take your next dosage?

a) 2 o'clock in the afternoon
b) 6 o'clock in the evening
c) I don't know

Ha o nwa t*ekanyetso ya pele ya* moriana wa mahlaba ka 8 hoseng mme mooki a o bollela ho nwa moriana wa mahlaba ka mora hora tse 6, o ka nwa neng tekanyetso e latelang?

a) Hora ya bobedi motshehare
b) Hora ya botshelela mantsiboya
c) Ha ke tsebe



10 Thabo has to give 2,5ml of cough syrup to his sister. Choose an option that will indicate that there is 2,5ml of syrup in the syringe

a) Choice A
b) Choice B
c) I don't know

Thabo o tlameha ho nwesa kgaitsedi ya hae moriana wa sefuba wa 2.5ml. Etsa kgetho ho bontsha 2.5ml sepeiting

a) Kgetho A
b) Kgetho B
c) Ha ke tsebe

ADDENDUM J

ENGLISH PATIENT INFORMATION LEAFLET, INTERVENTION STUDY INFORMATION DOCUMENT- ENGLISH

Title of research: A face-to-face peer support model for patients with Type 2 Diabetes

Good day

I, Melanie Pienaar, am doing research on face-to-face peer support in patients with type 2 diabetes. Research is just the process to learn the answers to questions. In this study, we want to find out how support can assist diabetic patients in the Free State.

We are inviting you to participate in this research study.

In the first part of the study, you will be asked to do the following:

1) To answer a few questions about your health to the researcher;
2) Have a finger-prick blood glucose test;
3) To answer questions about how you understand certain aspects about health;
4) To have your blood pressure measured; and
5) To have your weight, height and waist circumference measured

In the second part of the study, some participants will be selected to receive a form of support for 4-6 months and will be asked:

1) To attend group discussions with the community health worker once a month for 4-6 months. The discussions that will take place will be recorded;
2) To receive home visits from the same community health worker once a month for four months to enquire about your well-being.
3) The rest of the participants will continue receiving their usual care at the clinics.

After the 4-6 months, all the participants (also those who did not receive support) will again be asked to:

1) Have a finger-prick blood glucose test;
2) To have your blood pressure measured; and

3) To have your weight, height and waist circumference measured

Should the researchers see that the support the one group of participants received was beneficial; the group of participants who did not receive the support will also be given the opportunity to receive the same type of support.

The study does not pose serious risks to those participating. Should any participant experience any emotional discomfort during any stage of the study, counselling will be arranged without cost to the participant.

Benefits of being in the study are that your voice will be heard. Your opinions will be put together with others and this information will lead to better future care for patients with diabetes.

The participant will be given relevant information on the study while involved in the project and after the results are available.

You can decide whether you want to participate in the study or not. Should you decide not to participate, you will still receive the same standard of care as you usually receive. You will not be paid for taking part in the study and we will not expect you to pay anything for taking part in the study.

We will not share your name and contact details with anybody- the researcher is the only person who will be able to identify you. We will be telling other people of the study and what we found, but no one will know that you have participated in the study.

Absolute confidentiality cannot be guaranteed. Personal information may be disclosed if required by law.

Contact details of researcher – for further information

Melanie Pienaar Tel: 063 777 4452

Contact details of Health Science Research Ethics Committee Secretariat and Chair – for reporting of complaints/problems.

(051) 4052812

P.O

ADDENDUM K

ENGLISH CONSENT FORM:

INTERVENTION STUDY AND MMOGO-METHOD®: PATIENTS AND PEER SUPPORTERS

CONSENT FORM - English

Consent to participate in Research

I have been asked to participate in a research study titled: A peer support model for patients with Type 2 Diabetes

I have been informed about the study by ……

My participation in this research is voluntary, and I will not be penalized or lose benefits if I refuse to participate or decide to terminate participation. If I agree to participate, I will be given the participant information sheet, which is a written summary of the research. I understand that I will not receive remuneration for participation in this study and it will not cost me anything.

The research study, including the above information has been verbally described to me. I understand what my involvement in the study means and I voluntarily agree to participate. I have received the Information sheet and understand the content.

…….. …….

Signature of Participant Date

ADDENDUM L

PEER QUESTIONNAIRE ON DEMOGRAPHICS: INTERVENTION STUDY

PEER QUESTIONNAIRE

Only interview patients: That have signed consent

Instructions - Circle the appropriate number or write your answer in the space provided.

A. Interview number ☐☐☐☐

B. Name of facility .....

C. Date questionnaire is completed ...../...../.....(dd/mm/yy)

RESPONDENT PROFILE

Demographic information

1. Note respondent's gender

   1 Male
   2 Female

2. How old are you in years?.....

3. What is your home language?

   1 Sotho
   2 Tswana
   3 Other, specify.....

4. What is your highest level of education?

   1 Some high school
   2 Completed high school
   3 Certificate
   4 Diploma
   5 Other .....

5. How long (in years) have you been a community health worker?

ADDENDUM M

PEER MEASURE OF EFFECTIVE ATTRIBUTES OF TRAINERS (MEAT) QUESTIONNAIRE

Interviewer no: …….

Please rate yourself as accurately as possible along each of the characteristics listed. Choose the number indicating the extent to which that characteristic describes yourself using the scale below.

1	2	3	4	5
Very slightly/ not at all	A little	Moderately	Quite a bit	extremely

1. Experienced	……	17. Supportive	……
2. Likeable	……	18. Approachable	……
3. Sociable	……	19. Accessible	……
4. Friendly	……	20. Knowledgeable	……
5. Entertaining	……	21. Motivational	……
6. Prepared	……	22. Expert	……
7. Skillful	……	23. Humorous	……
8. Caring	……	24. Flexible	……

9. Open to criticism	……	25. Considerate	……
10. Warm	……	26. Professional	……
11. Passionate	……	27. Humble	……
12. Trustworthy	……	28. Intelligent	……
13. Respectful	……	29. Patient	……
14. Able to listen	……	30. Empathetic	……
15. Enthusiastic	……	31. Intellectually stimulating	……
16. Engaging	……	32. Communicates effectively	……

ADDENDUM N

PEER SUPPORTER INFORMATION LEAFLET:

INTERVENTION STUDY INFORMATION DOCUMENT- ENGLISH

Title of research: A face-to-face peer support model for patients with Type 2 Diabetes

Good day

I, Melanie Pienaar, am doing research on how support can assist patients with type 2 diabetes. Research is just the way of finding answers to questions. In this study we want to find out how support can assist diabetic patients in the Free State.

We are inviting you to participate in this research study.

In the study you will be asked to do the following:

1) To answer a few questions about your age, work experience and skill as a supporter;
2) To attend group discussions with the researcher once a month for 4-6 months;
3) To provide the same group discussions to a group of patients with type 2 diabetes from the clinic once a month for 4-6 months. These discussions will be audiotaped;
4) To visit the same group of patients at their homes at least once a month for 4-6 months and find out about their condition and record it on paper.

There are no dangers for those taking part in the study.

By taking part in this study, you will help the voices of the patients with type 2 diabetes in the community to be heard and this information will lead to better future care for patients with type 2 diabetes.

You will be provided with information while in the study and the results of the study will also be made available to you.

You can decide whether you want to take part in the study or not. Should you decide not to take part, you will continue with your work as you usually do. You will not be

paid for taking part in the study and we will not expect you to pay anything for taking part in the study.

We will not share your name and contact details with anybody- the researcher is the only person who will be able to identify you. We will be telling other people of the study and what we found, but no one will know that you have participated in the study.

This is the contact details of researcher for further information, Melanie Pienaar, 063 777 4452

This is the contact details of Health Science Research Ethics Committee Secretariat and Chair for reporting of complaints/problems, (051) 4052812.

ADDENDUM O

FACE-TO-FACE PEER SUPPORT PROGRAMME

FACE-TO-FACE

PEER SUPPORT PROGRAMME FOR PATIENTS WITH

TYPE 2

DIABETES

Session	Topic	Learning objective	Teaching and learning activities
One	An overview of diabetes	• Understand the role of peer supporter • What is diabetes • List symptoms of high blood glucose • Describe control and management of diabetes • Describe the ABCD's of diabetes • Demonstrate active listening, open-ended questions and making reflections through activities • Explain home-visit form	• Lecture • Group discussion • Sharing personal symptoms of high blood glucose • Reflection • Role-play
Two	Healthy eating	• Describe factors that affect eating • Understand the main food groups and their effect on blood glucose	• Role play • Group discussions • Sharing personal experience

		• Describe the ROBOT diabetes plan • Identify plans to include healthy eating into your life • Demonstrate an understanding of the plate method	• Reflection
Three	Physical activity and coping with stress	• List the benefits physical activity • Identify strategies to integrate physical exercise into daily routine • Demonstrate the “coconut” stretch exercise • Describe safe exercising • Recognize the signs of stress • Discuss the impact of stress and mood on diabetes • Identify strategies to manage stress and mood effective	• Role-modelling • Group discussions • Sharing individual personal experiences • Reflection

Four	Complications of T2D	• Identify the complications of diabetes • List strategies to reduce risk for blood vessel damage • List strategies to reduce risk of eye and dental disease • List strategies to take care of your feet	• Brainstorming • Group discussions • Personal experiences • Reflection

Lesson plan

Session 1

Welcome and introduction

Icebreaker activity:

- Introduce yourself and tell us where you were born and raised and how long you have been living in Thaba Nchu.

Material:

- Name-tags
- Flip file with contents of the programme, writing paper and a pen provided to each CHW

Setting ground rules:

What ground rules should be set for our training sessions?

- Do not interrupt each other when talking
- Place cell phones on silent or vibrate
- Respect each other by not laughing at each other's comments or suggestions
- Give everyone a chance to say sometimes
- What happens in the group, stays in the group

Purpose of the training programme

The purpose of this program is to teach you to help patients with diabetes to improve their self-management of diabetes in order to improve the quality of their lives.

- Why did you decide to take part in this program?
- What is important for you to learn?

At the end of the session, you will be able to do the following:

1.1 Understand the role of peer supporter

1.2 What is diabetes

1.3 List symptoms of high blood glucose

1.4 Describe control and management of diabetes (ABCDs)

1.5 Demonstrate active listening, open-ended questions and making reflections through activities

1.6 Understand the home-visit form

1.1 Role of peer supporters

To provide:

- Emotional support (listening, caring, empathy),
- Appraisal support (acceptance, encouraging),
- Informational support (reinforcing information on diet, exercise and medication adherence), and
- Instructional support (linking the individual, health and community resources) to patients with type 2 diabetes in order to promote diabetes self-management.

1.2 What is type 2 diabetes

Ask the group: Why do you think you developed diabetes?

- aging,
- inactivity, overweight / obesity, resistance to insulin

- family predisposition

1.3 Activity:

Provide the group with different pictures indicating possible symptoms of high blood glucose levels. Each participant may choose one picture representing his or her personal experience of high blood glucose symptoms. Ask each participant to paste their picture on the board and to explain their symptom of high blood glucose and the related feelings about that.

- Frequent urination
- Excessive thirst
- Fatigue
- Blurry vision
- Burning or tingling in your feet

1.4 Ask the group, “What are some things you do to help control your blood sugar?

One way to manage your diabetes health is to know your ABCDs. You can use them as a guide for making choices and changes. Write down the ABCDs on a board and discuss:

A A1C (blood glucose level)

B Blood pressure

C Cholesterol

D Depression

s Smoking

A1C

- Reduce portion size
- Less sweets, be aware of what you eat

- Reasonable weight
- Increase activity
- Take medicines as prescribed

Blood pressure

- Reduce salt
- Stop smoking
- More vegetables, fruits and whole grains
- Increase activity
- Maintain a reasonable weight
- Take medicines as prescribed

Cholesterol

- Reduce fatty foods
- Maintain a reasonable weight
- Take medicine to lower cholesterol
- High fibre diet

Depression

- Know the signs
- Get help

1.5 Demonstrate active listening, open-ended questions and making reflections through role-play.

The CHW must follow the following steps of active listening:

- Focus on participant and make eye contact
- Show interest in what the other person is saying
- Watch your body language
- Concentrate on feelings and emotions

- Use open-ended questions
- Make reflections (feelings and emotions)
- Show empathy and non-judgment
- Do not express your own views and feelings

The CHW must follow the following steps of open-ended questions:

- Allows participant to tell his/her story
- Use the words when, where, how, who, why, tell me more
- Open-ended questions cannot be answered by yes or no
- Allows the person to talk using their own words

The CHW must follow the following steps of making reflections:

- Reflect back the ideas, thoughts, or emotion of the other person
- Use the words: you seem sad / happy/ irritated, etc.

1.6 Understand home-visit form:

Home visit checklist

Patient: …….

Peer supporter: ……..

Home visit: Date: …… Duration of visit: ……

Area	Good	Satisfactory	Poor	Comment
Self-care status (Observe physical condition)				
Emotional status (How are you doing/coping at this time)				
Activity level (Tell me about your activity level)				
Nutrition (Tell me about your eating plan)				
Medication (Tell me how you take your medication)				

Activity:

By means of a round robin, ask the participants to reflect on their feelings of how you experienced the day.

Session 2

At the end of the session, you will be able to do the following:

2.1 Describe factors that affect eating

2.2 Understand the main food groups and their effect on blood glucose

2.3 Demonstrate an understanding of the plate method

2.4 Describe the ROBOT diabetes action plan

2.5 Identify plans to include healthy eating into your life

Apply active listening, open-ended questions and reflecting throughout the session

Welcome to all

Ice breaker (e.g. birthday girl/boy gets a gift bag/ or the oldest person in the group/ the happiest person in the group, etc)

Revision and questions on the previous months content

2.1 Factors affecting eating:

- Biological factors like hunger, appetite
- Economic factors like cost, income
- Physical factors like access, cooking skill, time
- Social factors like culture, family, peers
- Psychological factors like mood, stress, guilt
- Attitude, beliefs and knowledge level of food

2.2 Understand the major food group.

Healthy eating means that you choose a balance of foods from the six food groups.

The six food groups are:

- Carbohydrates/ Starch
- Proteins
- Fats
- Vitamins and minerals
- Water

Carbohydrates/ Starch provide fuel and energy to the body with energy and has a direct effect on your blood glucose level (*Patients to provide examples*).

Protein is the building blocks of the body and are important for the repair and healing of cells in the body. Proteins have no direct effect on your blood glucose level (*Patients to provide examples*).

Fat protects the organs and excessive intake leads to the accumulation of cholesterol in the body. Fats have no direct effect on your blood glucose level (*Patients to provide examples*).

Vitamins help the body to function and builds up immune system (*Patients to provide examples*).

Minerals strengthen the body and makes systems work optimally (*Patients to provide examples*).

Water removes waste products in the body.

Activity:

Participants are provided with a paper plate and pictures of various kinds of food from the different food groups. Participants were asked to demonstrate by using the pictures on the plate, what they would like to have for breakfast, lunch or dinner that day. Through a round robin, each participant presented their plate to the group. The group was asked to evaluate the contents of the plate and make recommendations.

Figure 1: Community health workers during the activity

2.3 The Plate Method is a way of helping you to manage portion sizes and types of food.

- At breakfast, fill 1/4 of your plate with starch, and 1/4 with protein.

Add a piece of fruit and a glass of milk.

- At lunch and dinner, fill 1/2 of your plate with non-starchy vegetables, 1/4 with meat and 1/4 with starch. Add a piece of fruit and a glass of milk.

Figure 2: Healthy plate (Department of Health, 2014)

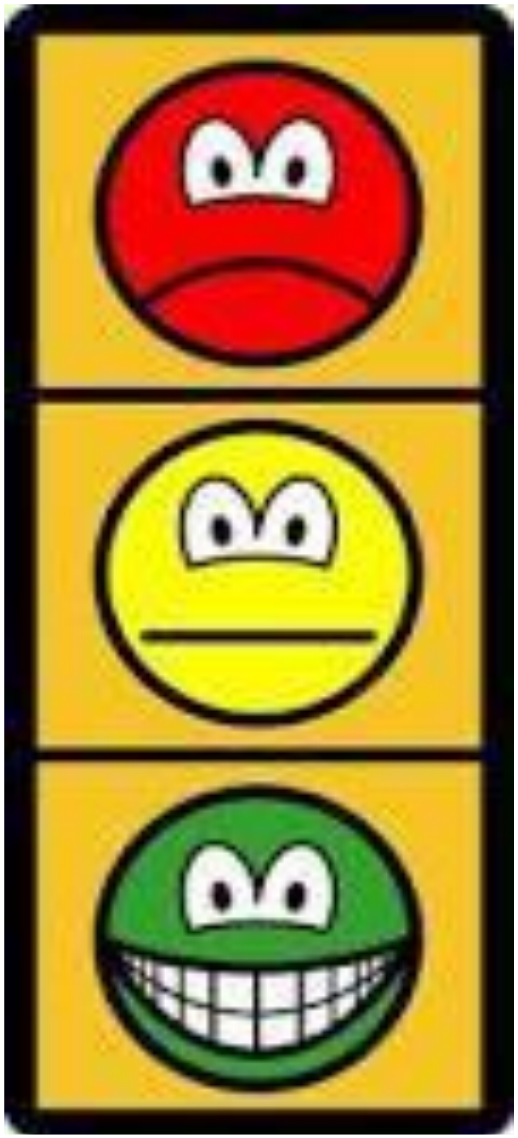
2.4 Describe the ROBOT diet

We use the robot as a basic guide to explain how a diabetic must eat to keep the blood sugar constant and under control.

- Every colour of the robot light represents a diet guideline.
- Red means no sugar; yellow means reduce fat and green means increase fibre.
- Thus, to follow a healthy diet, you must follow the rules of the robot lights when buying and preparing food

Activity:

By means of a round robin, ask the participants to reflect on their feelings of how you experienced the day.



The red light, means: STOP - No sugar

Sugar is very risky for a patient with diabetes.

Avoid:

- Sweets, chocolates and cakes
- Jam, honey and syrup
- Canned fruit, sweetened fruit juice, all fizzy drink and energy drinks
- Sugar (white, yellow or brown)

The orange light, means: BE CAREFUL – Use less fat

- Reduce or limit fatty food!
- Avoid full cream products, milk mixtures and butter
- Limit margarine, oil, nuts, avocado and peanut butter
- Buy margarine in a tub
- Don’t use two fats at the same time e.g. margarine and peanut butter

The green light, means: GO AHEAD - a lot of fibre

- Choose brown, whole-wheat or seed bread
- Choose oats rather than mielie-meal porridge
- Eat cold samp, mielie-pap and potatoes
- Try dry beans, lentils and peas
- Try to eat five portions of fruit and vegetables a day

Session 3

At the end of the session, you will be able to do the following:

3.1 List the benefits physical activity

3.2 Identify strategies to integrate physical exercise into daily routine

3.3 Demonstrate the “coconut” stretch exercise

3.4 Describe safe exercising

3.5 Recognize the signs of stress

3.6 Discuss the impact of stress and mood on diabetes

3.7 Identify strategies to manage stress and mood effective

Apply active listening, open-ended questions and reflecting throughout the session

Welcome to all

Ice breaker (e.g. birthday girl/boy gets a gift bag/ or the oldest person in the group/ the happiest person in the group, etc.)

Revision and questions on the previous months content

3.1 Benefits of physical activity.

- Improve blood glucose, blood pressure, cholesterol
- Improve energy levels
- Reduce anxiety, depression and stress
- Reduce weight
- Keep joints flexible
- Increase strength
- Improve balance
- Reduce risk of stroke and heart disease

3.2 Ask each participant: What kind of exercise do you enjoy doing?

- Gardening
- Walking
- Working in the house
- Fetching children from school

Ask each participant: Name three ways that you improve your activity level.

- Take a 10-minute walk after breakfast, lunch or dinner
- Use the stairs instead of using the lift
- Park the car a little farther from where you are going

3.3 Activity

Demonstrate the COCONUT stretch exercise.

Repeat.

3.4 Safe exercising

- Consult your doctor if you have other conditions
- Warm up, stretch and cool down to prevent injuries
- Start slowly
- Walking is a good start
- You should be able to talk while exercising
- Take a snack along if you exercise for long

3.5 What are the signs of stress:

- Irritability
- Anxious
- Short temper

- Tearful
- Withdrawal
- Can’t sleep overeating
- Unstable blood sugar

3.6 Impact of stress on diabetes

- Unstable blood glucose
- Increased risk for cardiovascular disease

3.7 Activity: Ask participant: How do you deal with stress? (Participants can share their personal views)

Strategies to cope with stress

- Being active
- Participating in faith-based activities
- Pursuing hobbies
- Attending support groups
- Involve family members as a support system
- Relaxation exercises
- Counselling
- Medication

Activity:

By means of a round robin, ask the participants to reflect on their feelings of how you experienced the day.

Session 4

At the end of the session, you will be able to do the following:

4.1 Identify the complications of diabetes

4.2 List strategies to reduce risk for blood vessel damage

4.3 List strategies to reduce risk of eye and dental disease

4.4 List strategies to take care for your feet

Apply active listening, open-ended questions and reflecting throughout the session

Welcome to all

Ice breaker (e.g. birthday girl/boy gets a gift bag/ or the oldest person in the group/ the happiest person in the group, etc)

Revision and questions on the previous months content

4.1 List the complications of diabetes

Stroke

Eye problems

Dental problems

Heart disease

Kidney problems

Nerve damage (loss of feeling, tingling, freezing, sharp jabbing pain, burning sensation, numbness, hypersensitivity)

4.2 Strategies to reduce blood vessel damage in diabetes

REMEMBER THE ABCDs OF T2D: CONTROL

A A1C

B Blood pressure

C Cholesterol

D Depression

s smoking

Activity:

One patient shares her story with the group of how she sustained serious burns to her legs due to blood vessel damage to the legs.

4.3 Ask the group:

What problems do you have with your eyes?

- Red eyes
- Double vision or vision abnormalities
- Spots or floaters
- Blurry vision
- Decreased peripheral vision
- Difficulty reading
- Eye pain or unusual eye pressure

How do they take care of your eye?

- Visit the eye doctor once a year

Ask the group:

What problems do you have with your teeth and gums?

- Sensitive teeth
- Plaque
- Bad breath
- Gum disease

How do you take care of your teeth?

- Visit dentist regularly
- Keep your blood sugar in check
- Use a toothbrush with soft bristles

4.4 Ask the group:

“How do you take care for your feet?”

- Take care of your feet, examine your feet every day
- Wash and dry properly
- Cut toenails straight across
- Don’t walk barefoot
- Seek help promptly

Activity:

By means of a round robin, ask the participants to reflect on their feelings of how you experienced the day.

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ADDENDUM P

PATIENT INFORMATION LEAFLET: MMOGO-METHOD®

Title of research: A face-to-face peer support model for patients with Type 2 Diabetes

Good day

I, Melanie Pienaar, am doing research on a face-to-face peer support in patients with type 2 diabetes. Research is just the way to find answers to questions. In this study, we want to find out your experiences of the support that you received as patients with type 2 diabetes.

We are inviting you to participate in this research study.

You will be asked to do the following:

- You will agree to participate in one group session for one day
- You will be asked to use straw, clay and beads to make a visual picture of your experience to help us to understand your experiences more clearly
- You will be asked to explain your picture
- You will agree to keep all statements discussed in the group confidential and keep the identities of participants anonymous.
- Besides myself, other professionals will be assisting during the group session
- They are, however, also bound by the same confidentiality and to keeping the identities of the participants anonymous
- No identifying information will appear about you in the research
- You can decide whether you want to participate in the study or not. Should you decide not to participate, you will still receive the same care as you usually receive.
- You will not receive financial or other reward for taking part in the study
- You have the right to withdraw from the research at any time
- I will audio and / or video record the group sessions so that I can transcribe the data for detailed analysis.

- The audio and video recordings will be destroyed after the research had been published
- If you are comfortable with the above arrangements and are willing to participate, I will ask you to sign consent to take part in the research and another consent to audio and /or video recording of the sessions
- The study does not pose any risks to those participating. Should any participant experience any emotional discomfort during any stage of the study, counselling will be arranged without cost to the participant.

I am very grateful for your assistance and contributions to this research project. Please contact me, the researcher, at 063 777 4452 for any additional information. Any queries that you may have regarding the research may be directed to the Health Science Research Ethics Committee Secretariat and Chairperson at 051 4052812, University of Free State.

ADDENDUM Q

CONSENT FORM FOR THE AUDIO/VIDEORECORDING OF

THE INTERVIEWS: MMOGO-METHOD®

I agree to the audio- and/or video-recording of the interviews between myself, Melanie Pienaar, her research team and other participants in the group session.

I understand that the recordings will be kept in a secure place during the research process to protect my identity, and destroyed after the research has been published.

I also understand that the recordings will be transcribed for detailed analysis and

that any identifying details that may arise during the interview will be deleted from the transcripts to protect my identity. The transcribed document, without identifying

details, will be electronically stored in a secure place for a period of five years.

Signature of participant Date

…… ……

Signature of researcher Date

…… ……