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Educational and Psychological Aspects

Healing through empowerment and active listening (HEALing): A mixed-methods evaluation of the feasibility and acceptability of a nurse-led self-care support intervention for people with diabetic foot ulcers

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Abstract

Aims: To evaluate the feasibility, acceptability, and implementation of HEALing (Healing through Empowerment and Active Listening)—a clinic-integrated self-care intervention delivered by trained wound care nurses in three 30-min face-to-face sessions over 6 weeks to support diabetic foot ulcer healing.

Methods: A mixed-methods, single-arm hybrid effectiveness–implementation pilot and qualitative study was conducted. Feasibility was evaluated through enrolment, retention, attendance and data completeness; acceptability via qualitative interviews; and implementation by tracking intervention delivery time. Potential effectiveness was assessed through changes in psychological (illness beliefs, foot care confidence, diabetes distress, quality of life, autonomy support), behavioural (foot care practices), knowledge (of wound deterioation), and clinical (HbA1c) outcomes from baseline to 4 weeks post intervention. Data were analysed using descriptive statistics, paired-sample *t*-tests and thematic analysis.

Results: A total of 29 individuals living with DFU participated in the study (response rate: 78%), with enrolment occurring between August and September 2024. Retention was 90% ($N = 26$). The average HEALing session lasted 32 min (range: 15–50 min). Statistically significant improvements were observed across psychological, behavioural, knowledge and clinical outcomes from baseline to post-intervention (all $p < 0.005$; Cohen's $d = 0.8–1.1$). Qualitative findings reinforced the intervention's acceptability, highlighting how HEALing enhanced knowledge, emotional healing and empowerment through autonomy,fostering greater motivation and engagement in self-care.

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Conclusions: This pilot suggests the feasibility and acceptability of HEALing in nurse-led DFU care, with preliminary indications of psychological and clinical benefits. The findings support the potential for scalable integration of psychological support, warranting further evaluation in larger, controlled trials with extended follow-up.

KEYWORDS

diabetic foot ulcer, nurse-led wound care, primary care, psychological intervention, self-care support

1 | INTRODUCTION

Diabetic foot ulcers (DFUs) are a significant global health burden, affecting approximately 18.6 million people worldwide and contributing to high morbidity, mortality and healthcare costs.[1] Around 50% of DFUs become infected, with up to 20% requiring hospitalization; of these, 15%–20% lead to lower-extremity amputation.[2,3] Recurrence rates reach 42% within a year of healing, and mortality among people in DFU remission[4] is as high as 64% over an 11-year follow-up.[5] The chronic and complex nature of DFUs places substantial financial strain on individuals, families and healthcare systems and inflicts debilitating physical and emotional distress on people with DFU.

Living with DFUs requires people to consistently engage in various self-care practices, including proper wound care, foot care to prevent deterioration or new ulcers, diabetes self management and regular attendance at multidisciplinary appointments.[6] Challenges with engaging in these practices increase the risk of delayed healing, hospitalization, amputation, worsening of ulcers and diminished quality of life. Despite the serious consequences, DFU self-care engagement remains challenging, including inconsistent self-care practices,[7] infrequent multidisciplinary team care[8] and inadequate foot screenings.[9]

The complexity of DFU management and the ongoing demands of self-care often lead to emotional distress, disease fatigue, fears of wound deterioration and uncertainty about healing.[10–12] These psychological burdens can undermine motivation and treatment engagement, complicating self-care behaviours.[10,11,13] Although many interventions focus on self-care education,[14–16] they frequently overlook the emotional impact of the condition. Empathy—crucial for improving adherence, reducing distress and promoting healing—is often absent in participant–clinician interactions.[17,18] There is a clear need for strategies that move beyond education to incorporate psychological support and foster emotional adjustment, empowering people to engage in sustainable, adaptive self-care.

What's new?

- Managing diabetic foot ulcers (DFUs) is complex, with ongoing self-care demands often contributing to emotional distress, fatigue and uncertainty; yet integrated, co-designed self-care support interventions within DFU care remain limited.
- The HEALing (Healing through Empowerment and Active Listening) pilot trial—a brief, low-intensity, nurse-led intervention co-designed with people living with DFU—was feasible and acceptable, achieving high recruitment, retention and attendance while showing improvements in psychological well-being, knowledge, self-care behaviours and clinical outcomes.
- Embedding brief psychological support within routine nurse-led DFU care appears feasible and may support people living with DFU in adopting adaptive self-care practices and enhancing emotional adjustment, informing future scalable approaches to DFU management.

To address these challenges, the HEALing intervention was co-developed as a nurse-led, clinic-integrated programme to support DFU self-care through Empowerment and Active Listening. Grounded in Self-Determination Theory (SDT)[19] and informed by Motivational Interviewing (MI),[20] the intervention promotes autonomy, builds confidence and enhances intrinsic motivation. By reinforcing people's strengths and fostering relatedness, HEALing supports psychological adjustment and empowers individuals to take sustained, adaptive responsibility for their DFU self-care.[21]

Evaluating HEALing through a hybrid effectiveness–implementation design is essential to understand both

its clinical impact and real-world feasibility.[22] The theoretical Framework of Acceptability (TFA)[23] provides a structured lens for assessing acceptability across seven domains: affective attitude, burden, ethicality, intervention coherence, opportunity cost, perceived effectiveness and self-efficacy. Applying the TFA enabled a systematic and nuanced exploration of participants' responses to the intervention within routine care.

This mixed-methods pilot evaluation had three aims: (1) to assess the feasibility of the intervention and study procedures (e.g. recruitment, retention, attendance, adverse events, and measure completion); (2) to evaluate acceptability using participants' experiences guided by the TFA; and (3) to examine implementation markers—such as delivery time and resource use—alongside preliminary changes in psychosocial,behavioural, and knowledge outcomes from baseline to 4 weeks post intervention.

2 | METHODS

2.1 | Design

A convergent mixed-methods approach was used, combining a single-arm hybrid effectiveness–implementation pilot trial with a qualitative study, following the CONSORT extension for pilot and feasibility trials.

2.2 | Setting

The study took place within a large primary healthcare cluster of eight polyclinics in central and northern Singapore, where wound care nurses (WCN) with advanced training provide routine DFU care, including wound assessment, dressing changes and patient education every 2–3 days. Collectively, these clinics manage approximately 1400 new DFUs annually in collaboration with specialists from tertiary hospitals through the DEFINITE Care programme (Diabetic Foot in Primary and Tertiary Care), a multidisciplinary initiative aimed at reducing ulceration and amputation rates.[24]

2.3 | Participants recruitment

2.3.1 | Participants

Participants were eligible if they (i) had an activeDFU, (ii) were aged ≥21 years, (iii) were receiving wound care at participating polyclinics and (iv) could provide informed consent. Exclusion criteria included toe pressure < 30 mmHg, active osteomyelitis, Charcot foot, or cognitive, hearing or visual impairments. A target sample of 25–30 participants was set based on published guidance for pilot trials to assess feasibility while accounting for potential dropouts.[25]

2.3.2 | Facilitator participants

Facilitators were WCNs providing routine DFU care at the participating polyclinics. At least eight WCNs (one per polyclinic) were recruited from existing staff to enable site-level delivery and evaluation. Before delivering HEALing, facilitators completed 20 h of training, including a half-day e-learning refresher on diabetes management and a two-day face-to-face motivational interviewing (MI) workshop. The workshop covered MI knowledge, agenda mapping, use of affirmations (via the card-sorting tool) and the ask-offer-ask framework for DFU education. Each facilitator also completed an individual coaching session with the first author to consolidate skills and ensure consistent delivery.

2.4 | Intervention

The theory-informed HEALing intervention is a brief, low-intensity programme designed to enhance autonomy and support emotional adjustment to promote DFU self-care. It was co-designed with individuals living with DFU and primary care wound care nurses through formative qualitative research to map people's needs,[11] followed by a series of workshops and co-design meetings to finalise its procedures, content, delivery and materials. Further details of the intervention were described elsewhere.[21]

The HEALing intervention begins with a card-sorting exercise that enables people with DFU to identify self-care priorities, supporting autonomy. Active and reflective listening, core MI techniques[20] enhance engagement by fostering connection. Using the Ask-Offer-Ask framework, HEALing provides permission-based, tailored information aligned with individual interests, such as specific self-care tasks. This personalised approach strengthens competence, a key driver of intrinsic motivation, while fostering relatedness and psychological well-being.

Embedded within wound care services, HEALing comprises three 30-min face-to-face sessions delivered by trained wound care nurses at 2-week intervals. Session outlines[26] are presented in Table 1.

2.5 | Procedures

Participants were recruited during routine wound care visits at participating clinics between August and

TABLE 1 HEALing session outlines.[26]

Session and theme	Outline of session
Session 1 Self management/ self-care skills, and setting goals related to treatment (week 1–2)	Introduce HEALing programme; agenda mapping of self-care tasks to identify areas of competency and areas in need of improvement; provide information/advice with permission using the Ask-Offer-Ask framework to support the chosen self-care task; review and issue participant education leaflets as appropriate/available for chosen topic of session; set a short-term goal using confidence rulers considering its benefits, barriers, and importance to practice before the next session.
Session 2 Managing mood--acceptance and hope [*This topic to be brought in with permission by nurse*] (week 3–4)	Invite participant to choose topic (see card sorting task photo); use affirmation (see card sorting task) and review of the 1st goal from session 1 to evoke and strengthen confidence that progress is underway. If topic on low mood/worry OR suggest topic with permission (e.g. low mood/ worry about would deterioration or topic that is deemed of high clinical importance e.g. self-wound care) – listen to concerns, use validation and normalisation to stabilise emotion (e.g. anxiety/worry as expected, adaptive response to a real threat; this threat can be mitigated with self-care); with permission use Ask-Offer-Ask framework to provide advice related to self-care and timely recognition or actions as means to reduce threat and adverse DFU outcomes; summary to start with worry is expected and normal, and finish with the steps taken or progress made with self-care to show that progress is being made. Offer/Ask feedback and then set a short-term goal using confidence rulers considering its benefits, barriers, and importance to practice before the next session.
Session 3 HEALing in Action-living life beyond foot disease (repeat card sorting task) (week 5–6)	Repeat card sorting task; affirm steps in right direction (even if goal is not met or perhaps with partial successes—good intentions) review goal *step up or down etc.; review goal setting progress and problems solve barriers (if any) for goal(s) set in sessions 1 and 2, and revise goals as needed; use Ask-Offer-Ask framework to problem solve lapses and barriers; use agenda mapping (as above) to address any pending important concerns; provide information/advice on chosen topic using the Ask-Offer-Ask framework; goal setting (using importance and confidence rulers to tailor goals and behaviour); conclude with Ask-Offer-Ask framework to provide additional advice and links to available resources as participant continue to move forward with their goals.

Note: This table is adapted from the study protocol.[26]

September 2024, where the HEALing intervention was embedded into standard care. Eligible participants were approached, and written informed consent was obtained. The first participant was enrolled on 12 August 2024.

Following enrolment, participants received three 30-min HEALing sessions, spaced 2 weeks apart over 6 weeks, with session content guided by the session outlines (Table 1). Each session was delivered immediately after the participant's routine wound care appointment by the same trained wound care nurse to ensure continuity.

Data collection included patient-reported outcome measure (PROM) surveys and clinical variable (HbA1c) at baseline (prior to the first HEALing session) and at 4 weeks post intervention. Additionally, in-depth interviews with participants and wound care nurse facilitators were conducted at 4 weeks post intervention to assess acceptability.

Full details of the protocol are available elsewhere[26] and registered at ClinicalTrials.gov (NCT06540170).

2.6 | Data Collection and outcome measures

Data sourced for both implementation and effectiveness outcomes are shown in Table 2. Participant-related data were collected using validated questionnaires and available electronic records at baseline and post-intervention time points. Qualitative data were also obtained through semi-structured interviews conducted post-completion of HEALing.

2.6.1 | Implementation (primary) outcome measures

We reported progression on implementation in conjunction with measures of feasibility and acceptability.

2.6.2 | HEALing intervention (secondary) effectiveness outcomes: Quantitative measures

Effectiveness was assessed as secondary trial outcomes under real-world conditions through validated patient-reported outcome measures (PROMs) (listed below) and clinical indicators at baseline and at 4 weeks post intervention. The specific PROMs have been widely used in DFU research globally and within the local context.

Behavioural outcomes

The Diabetes Foot Self-Care Behavior Scale (DFSBS)[29] comprises seven items across two sections. The first

TABLE 2 Implementation outcome measures[22,27,28] and data source and collection point.

Outcome measure	Description	Data source	Collection point
Feasibility	Feasibility of recruitment was assessed using screening logs, recording the number of participants who accepted the invitation and received the intervention. It was recorded including number of people complete the intervention. Measurement tools included time taken to conduct the HEALing sessions. We reasoned attendance and receiving at least three HEALing sessions as adequate.	Survey and administrative records	Prior to or during participation
Reach/penetration	Reach/penetration is defined as the integration of a practice within a service setting and its subsystems; refers to participation rate in the HEALing intervention by the intended audience.	Checklist, self report, case audit	After commencement
Fidelity	Fidelity was monitored through wound care documentation checklists and questionnaires in alignment with the HEALing intervention session outlines to ensure delivery as intended.	Checklist, self report, case audit	Throughout the study
Acceptability	Acceptability of the HEALing intervention was explored through semi-structured interviews and survey to understand participants' perceptions, attitudes, and beliefs about its relevance and sustainability.	Survey, qualitative interviews	Prior to participation, ongoing
Implementation cost	Implementation cost is defined as the cost impact of an implementation effort.	Administrative records	Throughout study window

assesses the number of days participants performed foot care in the past week (0–7 days), while the second rates the frequency of general foot care activities on a 5-point scale (1 = never to 5 = always). Scores from both sections are summed (range: 7–35), with higher scores indicating better self-care.

Psychological outcomes

Brief-illness perceptions Questionnaire (BIPQ)[30] is a validated tool used to assess illness perceptions among people with chronic conditions such as diabetes. It consists of eight items rated on a 0 to 10 ordinal scale. Higher scores indicate higher perceived negative illness perceptions.

Diabetes Distress Scale (DDS)[31]: This scale consists of 17 items with four subscales including emotional burden, physician-related distress, regimen-related distress and interpersonal distress. All items were rated on a 6-point Likert scale where a higher score indicates greater distress.

Foot Care Confidence Scale (FCCS)[32]: this validated instrument consists of 12 statements about the confidence level perceived by the participants in undertaking various foot-care activities using a 5-point Likert scale response. A higher total score represents greater self-efficacy.

Participants' perceptions of autonomy support were measured using the 6-item Health Care Climate Questionnaire (HCCQ).[33] Participants rated items on a 7-point Likert scale (1 = not at all true, 7 = very true). The higher score represents greater autonomy support.

Knowledge

Warning Signs of Diabetic Foot Ulcer Deterioration Knowledge Questionnaire (WS-DFUD-KQ)[34] consists of 12 items that were used to evaluate participants' knowledge about the infection signs related to superficial tissue, deep tissue and osteomyelitis as well as signs of deterioration in regard to peripheral vascular insufficiency. The total score is 12, with higher scores indicatinggreater knowledge levels.

Health-related quality of life (HRQoL)

HRQoL was measured using the EQ-5D-5L,[35] which includes five domains—mobility, self-care, usual activities, pain/discomfort and anxiety/depression—each rated on five levels from 'no problems' to 'extreme problems'. It also includes a 20 cm visual analogue scale (VAS) where participants rate their current health from 0 ('worst imaginable') to 100 ('best imaginable'). Only EQ VAS score was analyzed in this study.

Clinical indicators

Clinical indicators including HbA1c levels were assessed at baseline and 4 weeks post-intervention.

2.6.3 | Qualitative interviews

At post-intervention week 4, semi-structured face-to-face interviews were conducted with HEALing participants

and wound nurse facilitators who expressed interest in sharing their experiences with the programme. Examples of interview guides include: How was your experience of receiving/facilitating the HEALing intervention? What worked well (for participants: i.e. what motivated you to engage in self-care after the HEALing sessions? For facilitators: i.e. any moments/encounters that stood out for you? What worked less well or may have been challenging in implementation or facilitation?) The interviews lasted approximately 30–45 min and were audio-recorded with participants' consent, then transcribed verbatim for analysis.

2.7 | Data analysis

2.7.1 | Quantitative analysis

Statistical analyses were conducted using SPSS Version 28. Baseline characteristics were summarised using descriptive statistics: mean (SD) for continuous variables and number (%) for categorical variables, including recruitment and retention rates.

Pre- and post-intervention comparisons of behavioural, psychological, knowledge, HRQoL and HbA1c outcomes were conducted using paired *t*-tests. Effect sizes (Cohen's d) were calculated to assess the magnitude of change. Statistical significance was set at $p < 0.05$.

2.7.2 | Qualitative analysis

Qualitative data were analysed thematically following Braun and Clarke's framework,[36] using a reflexive inductive–deductive approach and reported in accordance with the COREQ checklist.[37] Analysis steps included: familiarisation with the data, generating initial codes, searching for themes, reviewing potential themes, defining and naming themes and producing the final report. Three researchers (XZ, PL, RY) independently coded transcripts, with discrepancies resolved through discussion and consultation with a senior researcher (KG, Associate Professor and Chartered Health Psychologist) to ensure rigour and reflexivity. Codes were developed inductively and refined through iterative team review and cross-referencing with field notes. Data from individuals with DFU and wound care nurse facilitators were coded separately and merged where themes overlapped, preserving their distinct perspectives on the HEALing intervention. Ongoing team discussions and constant comparison across themes enhanced credibility, and representative quotations were selected to illustrate key findings.

2.7.3 | Integration of quantitative and qualitative data

Integration occurred at the interpretation stage through systematic side-by-side comparison of quantitative outcomes (feasibility, acceptability and preliminary behavioural and clinical measures) and qualitative themes (perspectives of participant and wound care nurses).[38] Areas of convergence, complementarity, and divergence were identified to contextualise quantitative findings with qualitative insights, explain observed outcomes, and provide a comprehensive understanding of how the HEALing intervention supported DFU self-care and psychological adjustment in primary care.

2.8 | Ethics

The study protocol was reviewed and approved by the National Healthcare Group Domain Specific Review Board ethics committee (Ref No. 2022/00895) and the Nanyang Technological University Institutional Review Board (Ref No. NTU IRB-2022-338). Individual written consent was obtained from each participant by researchers.

3 | RESULTS

3.1 | Enrolment and baseline characteristics

A total of 29 participants were recruited to the study. Three participants (10%) withdrew prior to completion. Compared to retained participants, all withdrawals were men, presented with smaller mean wound areas ($1.7 \pm 0.9\,cm^2$), and were more likely to have recurrent DFU (67%). Those who withdrew also demonstrated suboptimal glycaemic control [mean HbA1c 90 ± 31 mmol/mol ($10.4 \pm 2.8\%$)], multiple concurrent ulcers (67%), and one-third had a history of amputation. Baseline characteristics for the 26 participants (90%) who completed post-intervention assessments at 4 weeks are presented in Table 3.

3.2 | Primary outcomes: Feasibility

Between August and September 2024, 45 individuals were screened; 37 were eligible, eight declined participation, and 29 consented (78% enrolment). Three participants withdrew, and 26 completed the HEALing intervention delivered over 6 weeks, including all sessions and post-intervention assessments (90% retention).

TABLE 3 Baseline characteristics of participants who completed post-intervention assessments.

Sociodemographic and clinical variables	Retained ($n=26$); N (%)
Age (years) (Mean ± SD)	64 ± 10
Gender (Male)	18 (69)
Ethnicity	
Chinese	12 (46)
Malay	6 (23)
Indian	8 (31)
Education level	
Primary and below	9 (35)
Secondary and above	17 (65)
Marital status	
In relationship	17 (65)
Not in relationship	9 (35)
Employment	
Working	5 (19)
Not working	21 (81)
Dwelling	
1–2 room flat and rented	6 (23)
3 room flat and above	20 (77)
Duration of diabetes (years) (Mean ± SD)	20 ± 11
HbA1c (mmol/mol, %) (Mean ± SD)	83 ± 18 (9.7 ± 1.6)
Duration of DFU (weeks) (Mean ± SD)	11 ± 8
First time/Recurrent DFU	
First time	14 (54)
Recurrent	12 (46)
History of amputation	
No	14 (54)
Yes	12 (46)
Wound area (cm^2) (Mean ± SD)	5 ± 6.5
Location of DFU	
Toe level	19 (73)
Proximal to toe level	7 (27)
Activity of Daily Living	
Require assistance*	3 (12)
Independent	23 (88)
Number of DFU	
1	18 (69)
>1	8 (31)
Comorbidity/Multimorbidity	
Hypertension (Yes)	24 (92)
Renal impairment (Yes)	5 (19)

Abbreviations: ADL, activity of daily living; DFU, diabetic foot ulcer.

Figure 1 details the withdrawal reasons along with eligibility criteria, participation rates, and overall study flow.

The average duration for the HEALing sessions was 32 min (SD = 39 min; range: 15–50 min).

Across all sessions, the HEALing topic most frequently identified as 'managed not so well/had great difficulties' was '*my fears and frustrations about the wound*' ($n=18$), followed by '*HbA1c management*' ($n=14$), '*recognising wound deterioration*' ($n=11$) and *following 'dietary advice'* ($n=11$) (Figure 2).

3.3 | Secondary outcomes

3.3.1 | Preliminary outcomes of **PROMs**

Preliminary effectiveness was evaluated by comparing psychological, behavioural, knowledge, and HRQoL outcomes from baseline to 4 weeks post intervention. Statistically significant improvements were observed across all measures (see Table 4; all $p<0.005$; Cohen's d = 0.8–1.1).

3.3.2 | Preliminary clinical outcomes

Clinical outcomes (HbA1c) are presented in Figure 3 and Table 4. Among 19 participants with available data, statistically significant improvements were observed from baseline to 4 weeks post intervention ($p=0.002$; Cohen's d = 0.8). Post-intervention, 21% achieved target HbA1c levels [<53 mmol/mol (7%)], while 79% showed reductions from baseline, with a mean HbA1c of 65 ± 19 mmol/mol (8.1% ± 1.7).

3.4 | Acceptability

Acceptability was explored via semi-structured interviews with 26 participants with DFU and 10 wound care nurse facilitators. Participant demographics are presented in Table 2. The wound care nurse facilitators had an average age of 39 years and an average of 8 years of experience in primary care wound management.

Thematic analysis revealed six key themes aligned with the psychological needs of competence, relatedness and autonomy from SDT (Figure 4): (1) enhanced knowledge, (2) emotional healing, (3) my guide on my side, (4) satisfaction with materials, (5) ideal scheduling and (6) power with autonomy. These needs were supported through the intervention's collaborative, empathetic delivery, consistent with MI principles. Together, the themes illuminate participants' experiences and the psychological dimensions underpinning intervention acceptability and impact. Details of the themed and illustrative quotes are presented in Table 5.

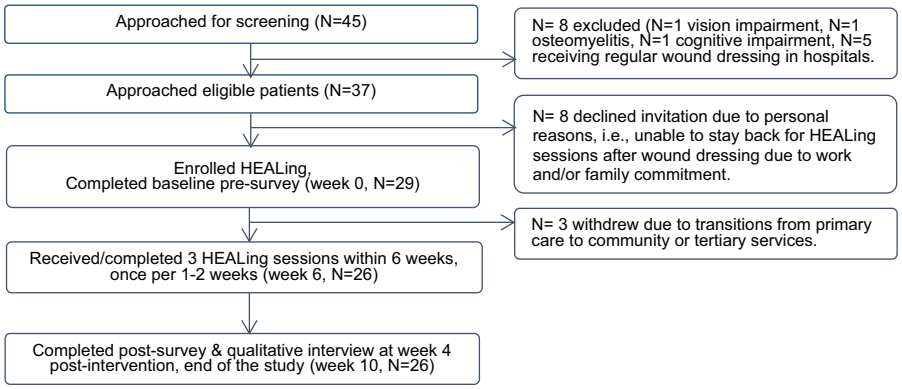

FIGURE 1 Flow of participants through the study.

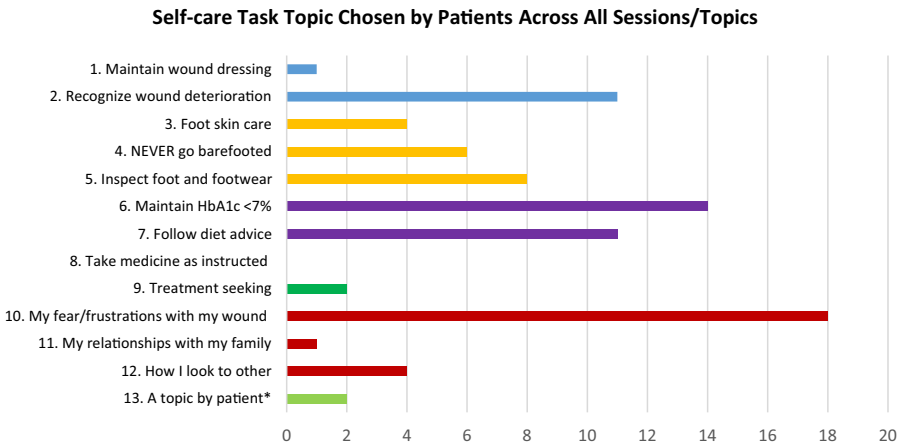

FIGURE 2 HEALing Topics Identified/Chosen by Participants as "managed not so well/had great difficulties". * **A topic by patient** includes '*social stigma related to foot amputation*' and '*reducing smoking*'. Topics 1–2 (blue bars) fall under the **wound care** category; Topics 3–5 (orange bars) under **foot self-care and footwear**; Topics 6–8 (purple bars) under **diabetes care**; Topic 9 (dark green bar) under **Treatment seeking**; Topics 10–12 (red bars) under **worries and concerns**; and Topic 13 (light green bar) represents **A topic by patient**.

Wound care nurse facilitators also reported practical challenges in delivering the intervention, including resource constraints and the need for additional training to build confidence. These observations provide important context for implementation and highlight considerations for supporting facilitators in primary care.

4 | DISCUSSION

This pilot study evaluated the feasibility, acceptability and preliminary effectiveness of embedding a brief, nurse-led, person-centred psychological intervention within routine DFU care in primary care settings. Using a mixed-methods, single-arm hybrid effectiveness–implementation design, the study suggested that integrating psychological support into routine wound care is feasible and acceptable to people with DFU and wound care nurses in primary care.

HEALing demonstrated feasibility and showed potential for integration into routine clinical practice. Low attrition, high engagement, and positive feedback indicated practical viability, with no dropout related to assessment burden or intervention relevance. Delivery by existing wound care nurses without disrupting routine services suggests potential for scalability and sustainability.

By leveraging existing infrastructure, HEALing offers holistic, person-centred care without considerable system burden. Moving beyond traditional education models, it integrates behavioural and psychological support within routine care, aligning with evidence on the psychological burden of DFUs[39] and the need for integrated care.[6] HEALing provides a feasible, scalable approach with potential to improve emotional well-being and clinical outcomes.

The intervention also demonstrated acceptability within routine DFU care. Qualitative interviews, aligned with the TFA,[23] provided insights into participant experiences. Themes such as '*enhanced knowledge*' and '*satisfaction with materials*' reflected intervention coherence, while '*emotional healing*' and the '*my guide on my*

TABLE 4 Paired samples *t*-tests between baseline and post-intervention (4 weeks from the 3rd HEALing session).

Measures	Baseline score mean (SD)	Post-intervention score mean (SD)	Score range	Paired-sample *t*-tests		Cohen's d between baseline and post-intervention
				t	*p*	
Brief Illness Perception Questionnaire Score	47.9 (10.0)	35.4 (10.6)	0–80	6.1	<0.001	1.1
Foot Care Confidence Score	32.7 (4.3)	40.7 (8.3)	12–60	−4.2	<0.001	0.8
Healthcare Climate Questionnaire (HCCQ) Score*	3.5 (0.9)	5.4 (1.5)	1–6	−5.8	<0.001	1.1
Diabetic Foot self-care Behaviour Score	20.2 (3.8)	25.9 (4.1)	7–35	−5.3	<0.001	1.0
Diabetes Distress Scale	3.5 (0.9)	2.6 (0.9)	1–6	5.5	<0.001	1.0
Emotional	3.8 (1.0)	2.7 (0.9)	1–6	5.6	<0.001	1.0
Physician	3.4 (1.1)	2.7 (0.9)	1–6	3.2	0.003	0.6
Regimen	3.3 (0.9)	2.6 (0.8)	1–6	5.1	<0.001	0.9
Interpersonal	3.2 (1.1)	2.5 (0.9)	1–6	3.7	0.001	0.7
HRQoL EQ VAS Score	57.3 (15.2)	70.8 (13.6)	0–100	−4.4	<0.001	0.8
Warning Signs of DFU Deterioration Questionnaire	7.7 (2.0)	9.4 (1.4)	0–12	−3.6	0.001	0.7
Clinical outcome						
HbA1c (mmol/mol; %) ($n = 19$)	83 (18); 9.7 (1.6)	65 (16); 8.1 (1.5)	NA	3.7	0.002	0.8

*HCCQ for assessment of perceptions of autonomy support; DFU: diabetic foot ulcer.

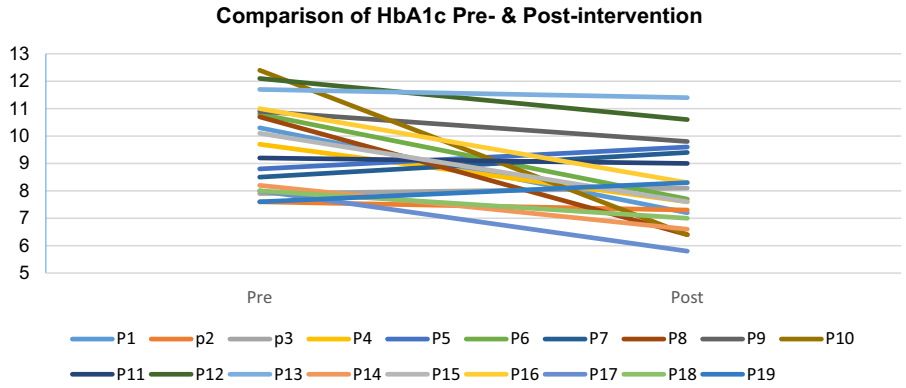

FIGURE 3 Comparison of HbA1c between pre- and post-intervention ($n = 19$).

side' experience illustrated positive affective responses and relational trust. The theme of '*power with autonomy*' reflected perceptions of self-efficacy and ethicality, supporting confidence in value-aligned decision-making. Participants also described the scheduling as convenient, suggesting low burden and opportunity cost. Collectively, these findings indicate that HEALing aligned with the TFA constructs and was acceptable within the context of routine DFU care.

Quantitative findings showed significant improvements across psychological, knowledge and behavioural outcomes. These consistent changes across a broad range of PROMs likely reflect the intervention's comprehensive, person-centred design and delivery within established clinical relationships. Qualitative data corroborated these findings, identifying themes related to key content

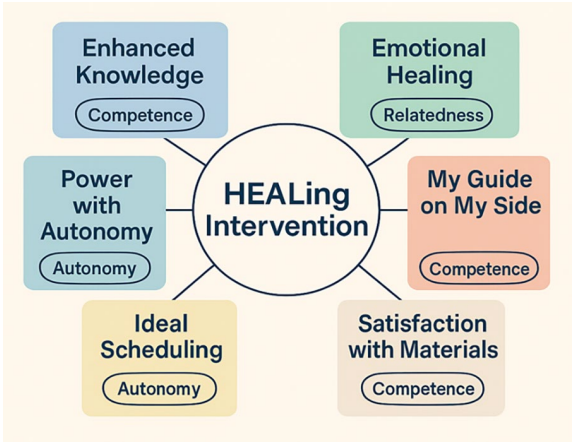

FIGURE 4 Thematic insights based on participant experiences of the HEALing intervention.

TABLE 5 Themes and illustrative quotes.

Theme	Illustrative quotes
Theme 1. Enhanced Knowledge Participants described improved understanding of DFU infection and self-care, which enhanced confidence, informed decision-making and a sense of control. Clear, relatable information delivery fostered awareness of their condition's seriousness. One participant noted a 'better understanding' that prompted greater vigilance, reflecting how facilitator support strengthened competence and autonomy through practical guidance.	*'After she (the wound nurse facilitator) explained, then I know that shoes are very important, I started wearing the right footwear. Last time I just wear the normal shoes'. (P12)* *'So after talking to a nurse, I have better understanding of wound infection. At least I know what to do when next time see a new wound, like I couldn't delay in seeking treatment'. (P15)* *'She (the wound nurse facilitator) helped me know more about the wound, like how the wound started from and the coloration and what you were supposed to do on when you encountered this kind of issues. I become more vigilant on the wound infection part, like, what's the cause for the infection and what can it prevent from getting the same again. I think that's the best for everyone'. (P16)*
Theme 2. Emotional Healing Participants shared that the intervention created a safe, non-judgemental space for emotional expression, helping participants process feelings of guilt, fear and frustration. Feeling heard and validated promoted trust, emotional safety and openness, reflecting person-centred care principles.	*'Emotions play a part! ... at least and somebody's with me, I am not alone, someone that I can talk around...' (P15)* *'When we go back from the clinic after talking to the nurse (facilitator) even though we still got the wound, but when we come back from the clinic, even though we're very tired, but we feel very happy and less stressed'.(P25)* *'Never judge us! Never judge, never blame! or whatever, whether you're better or not, let's say, your wound is very bad and smelly... but the caring part is that they are with us, listen to us... this is very important'. (P7)*
Theme 3. My Guide on My Side Participants described facilitators as respectful, collaborative partners who listened and guided without directing. This autonomy-supportive relationship fostered personal agency, trust, and motivation—captured by one participant's view: *'we are the drivers'*.	*'She listens, explains, asks and teaches me so well. The kind of caring partnership willing to help me, teach me and provide professional advice'. (P8)* *'...only guide us, give advice, take care, not forcing or whatever. This made us to understand that ultimately, yeah, the bottom part is we can take care of ourselves and we are the drivers'. (P7)*
Theme 4. Satisfaction with Materials Participants reported high satisfaction with the intervention materials, describing them as clear, relevant and easy to use. Visual aids, written resources and interactive elements reinforced key messages and supported engagement. The card-sorting game was especially effective, promoting self-reflection, helping participants articulate concerns, identify priorities and build self-awareness. It encouraged ownership of care and strengthened motivation and self-efficacy.	*'Sometimes by talking you cannot, by picture, you know how to tell them and know your problems by heart and started thinking of change. The cards with pictures are more visual, cool and very helpful. Most of time, when people ask, we do not know to tell them our problems'. (P25)* *'Because of this card game, it explained to me slowly -- tell me "what I did not do well, what I did well". There is no pressure, it's been decades, and this foot has been operated on many times'. (P8)* *'This project is new, and it's very different from usual education. Using card-sorting is unique to encourage us to think about our self-care practice... It helped us a lot! Helped me to know that I am actually working hard to do better care'. (P5)* *The card sorting itself I think actually gives the patients this visual cue and actually allows them to actually identify what they actually know and what they actually don't know (N7)*
Theme 5. Ideal Scheduling Participants highlighted flexibility in scheduling and delivery as a key strength of the intervention. The ability to tailor sessions around personal routines and preferences minimized disruption and supported sustained engagement over time.	*'It is you who follows our (wound care) schedule to design HEALing programme to maximize the opportunity and enable us to be benefited from HEALing. This is very good. I thought this is I think 100% hundred points for this program'.(P7)* *'This program is so well organized, especially it's not that a special arrangement for me to attend this. It's to gather when I'm coming for wound dressing, then at the same time, spend half an hour, one hour with your nurse. Don't need to say purposely want to come in then. This is very important'.(P6)*
Theme 6. Power with Autonomy Facilitators and participants agreed that change is personal, challenging, and self-directed. Rather than directing behaviour, facilitators created space for participants to develop their own insights. Participants described moving from resistance and emotional struggle to greater confidence and readiness for action, attributing this shift to the HEALing programme's compassionate, autonomy-supportive approach. The intervention fostered health ownership, supporting personal growth, improved self-care, and meaningful clinical gains.	*'Keep rolling with struggles - as much I wanted to help them out but knowing that, that I have my own limitations as well, I'm not able to, you know, I'm not God, I can't really change their mind. Yeah. If they really don't want to change. Yeah. So, so sometime, after the interview, sometimes it's quite sudden, you know, when, when they, when they actually know what is wrong in their life'. (N6)* *'They (nurses) gone through training, make us think about change. People usually don't want to change because change is painful. I don't want to change like sometimes even my family members tell me don't eat, you know, I just ignored them. ...HEALing made me a better person. It empowered me to change!' (P7)* *'When I knew I was diagnosed with this (infected diabetic foot ulcer), I can't accept myself. But right now I slowly to improve and after this program. I improved a lot. I improve even my glucose level is right now quite stable. I realised that my HbA1c is 8.1 now. But it's only 2 months so I think it's a great achievement from 13 (before HEALing) although I'm aiming to achieve a 7.1 reading. Now, I should say I don't care what people say and look at me now. So I tell you that it is the HEALing programme that I benefited 100%! After all, I need to take care of myself! For my self-care like diet and foot care'. (P7).*

(e.g. enhanced knowledge, emotional healing, 'my guide on my side') and delivery (e.g. autonomy support, flexible scheduling and material satisfaction). Together, these findings suggest that HEALing may function as both an educational and motivational resource, supporting sustained self-care within routine DFU management.

The intervention's acceptability and engagement were supported by its empathic, non-judgemental, person-centred communication style, grounded in SDT[19] and delivered via MI.[20] Participants identified emotional concerns—such as 'my fears and frustrations with my wound'—as key areas requiring support and expressed that HEALing fostered emotional safety, self-efficacy and intrinsic motivation, all essential for behaviour change and emotional adjustment. These findings are consistent with evidence supporting motivational communication in podiatry consultations for DFU, particularly in improving offloading adherence.[40] By embedding a co-designed, person-centred self-care intervention within nurse-led wound care, this study builds on previous work and addresses a critical gap in primary care DFU management.

Notably, glycaemic control was a key priority within HEALing, with '*maintaining HbA1c*' receiving the second most attention. The observed improvement in HbA1c aligns with the qualitative findings. Although levels improved post-intervention, mean HbA1c remained above target, indicating ongoing risk and the need for continued support. Integrating participant education and counselling on glycaemic management within DFU care reflects participant priorities and clinical goals, underscoring the value of comprehensive, person-centred approaches. Interventions such as HEALing, which foster autonomy and address psychological needs, may help translate motivation into sustained self management, supporting wound healing and long-term diabetes outcomes.

4.1 | Strengths and Limitations

This study's strengths include the involvement of people living with DFU and clinicians during the piloting of the HEALing intervention, enhancing its relevance and potential for integration within routine DFU care. Collaboration with wound care nurses and people living with DFU ensured practical applicability and acceptability within clinical workflows. The mixed-methods design provided a comprehensive assessment of feasibility, acceptability and preliminary outcomes, with qualitative data enriching the interpretation of quantitative findings. Furthermore, this pilot advances implementation science by demonstrating the feasibility of embedding person-centred psychological support into nurse-led DFU care.

Limitations include the single-arm design, small sample size and brief follow-up, which constrain generalisability and preclude causal inference. The short duration limits conclusions regarding long-term effectiveness and sustainability. While self-reported measures may be subject to social desirability bias, triangulation with qualitative data mitigated this risk. Future research should employ randomised controlled trials with larger, more diverse samples and extended follow-up to evaluate effectiveness, sustainability, and cost-effectiveness. Additionally, assessment of intervention fidelity, nurse training and organisational readiness will be critical for successful wider implementation.

5 | CONCLUSION

This pilot study demonstrates that the HEALing intervention is a feasible, acceptable and promising approach to supporting self-care in individuals with DFU within routine nurse-led care. Its person-centred, psychologically informed design facilitated meaningful improvements across psychological, behavioural, and clinical outcomes. Delivered by trained wound care nurses within existing pathways, HEALing has potential to offer a scalable and sustainable model for integrating psychological support into DFU management. These findings support further evaluation through a larger, controlled trial with extended follow-up, to enhance generalisability and real-world applicability.

AUTHOR CONTRIBUTIONS

Research concept and study design: KG and ZX; data collection: XZ, RWSK, RY and PXHL; data analysis and interpretation: ZX, PL, FHFC, RY and KG; supervision: KG and LES; manuscript drafting and revision: ZX, KG, and FHFC. All authors reviewed and approved the final version.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflict of interests.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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