

Piloting a culturally appropriate, localised diabetes prevention program for young Aboriginal people in a remote town

Kimberley H. Seear^{A,E}, David N. Atkinson^A, Matthew P. Lelievre^{B,C}, Lynette M. Henderson-Yates^B and Julia V. Marley^{A,D}

^AThe Rural Clinical School of Western Australia, The University of Western Australia, 12 Napier Terrace (PO Box 1377), Broome, WA 6725, Australia.

^BDerby Aboriginal Health Service, 1 Stanley Street (PO Box 1155), Derby, WA 6728, Australia.

^CPresent address: North and West Remote Health, 53 Enid Street (PO Box 1127), Mount Isa, Qld 4825, Australia.

^DKimberley Aboriginal Medical Services, 12 Napier Terrace (PO Box 1377), Broome, WA 6725, Australia.

^ECorresponding author. Email: kimberley.seear@rcswa.edu.au

Abstract

Lifestyle changes are central to preventing type 2 diabetes. Embarking upon and sustaining change is challenging, and translation of prevention approaches into a wider range of real-world settings is needed. In this study, a locally adapted community-led diabetes prevention program with local young Aboriginal facilitators was created and trialled through the Derby Aboriginal Health Service (DAHS). The 8-week program highlighted causes and consequences of diabetes, incorporated physical activity and healthy eating topics with a focus on practical activities, and included stress management to support healthy lifestyles. Ten Aboriginal women and men aged 18–38 years participated in the pilot program. The program was found to be acceptable and appropriate, and other community members and organisations expressed interest in future participation. Participants reported that they gained important new knowledge and made changes in behaviours including shopping choices, portioning and soft drink consumption. Limitations included participant recruitment and attendance difficulties, which were attributed to program timing and competing demands. While this program was designed to be sustainable, and there were indications of feasibility, resource constraints impeded its integration into routine primary health care. Prevention of diabetes is a high priority for DAHS, and this program, with appropriate resources, provides a basis for ongoing practical prevention strategies.

Keywords: healthy lifestyle, lifestyle modification, tailored intervention, feasibility study

Running head: Prevention program for young Aboriginal people

What is known about the topic?

- Lifestyle modification can prevent or delay type 2 diabetes, which disproportionately affects Aboriginal people and is occurring at younger ages. Localised, culturally relevant prevention programs, utilising this evidence, are needed.

What does this paper add?

- Tailoring prevention programs for younger people, run by local Aboriginal people, is feasible in remote resource-limited settings. However, service funding approaches do not support a sustained prevention focus in high-needs settings.

Introduction

Type 2 diabetes (T2D) is a largely preventable global epidemic. The US Diabetes Prevention Program (DPP) and Finnish Diabetes Prevention Study randomised controlled trials demonstrated that intensive, individualised lifestyle modification programs could delay or prevent T2D among ethnically diverse people at high risk. These diet and physical activity-focused interventions reduced diabetes incidence by 58% during the trials (Tuomilehto *et al.* 2001; Knowler *et al.* 2002) with benefits apparent up to 15 years later (Lindstrom *et al.* 2013; Diabetes Prevention Program Research Group 2015). These findings have been applied in various settings and additional targeted interventions are needed (Galaviz *et al.* 2018). Successful programs include small-group DPP translations for Indigenous communities including the PILI ‘Ohana project in Hawaii (Mau *et al.* 2010).

In Australia, Aboriginal and Torres Strait Islander people have higher T2D rates than non-Indigenous people and a substantial burden of diabetes and pre-diabetes before age 25 years (Azzopardi *et al.* 2018). There are few published reports of interventions for Aboriginal people in their teens and 20s. Programs tailored to young peoples’ needs and embedded in communities are required. Primary health care services are a promising setting for diabetes prevention programs (Laatikainen *et al.* 2007), such as the Aboriginal Community Controlled Health Services (ACCHS) sector providing crucial comprehensive care (Panaretto *et al.* 2014) including programs supporting lifestyle changes (Firth *et al.* 2012; Dimer *et al.* 2013; Davey *et al.* 2014; Mills *et al.* 2017).

The Derby Aboriginal Health Service (DAHS) was involved in creating a novel diabetes prevention program for young Aboriginal people (around 15–25 years) based on community direction and previous research evidence, with limited resources. In this paper we report on the process of piloting this program and its acceptability and feasibility.

Methods

Ethics

This study was endorsed by the DAHS Board and Kimberley Aboriginal Health Planning Forum Research Subcommittee, and approved by the Western Australian Aboriginal Health Ethics Committee. Participants provided written informed consent. Participants could provide their own consent from age 16 years and younger people could choose to participate with parent/guardian consent.

Setting

Derby is a small, isolated north-west Australian town. DAHS provides broad primary health care and values prevention as reflected in its mission statement. However, like other Kimberley ACCHSs, DAHS has a massive workload managing existing complex health problems associated with socioeconomic disadvantage. This study built on previous collaborations between DAHS and the Rural Clinical School of Western Australia (Marley *et al.* 2012; Marley *et al.* 2014; Warwick *et al.* 2019).

Recruitment

Eligible participants were Aboriginal people aged from 15 years, with young people at risk for diabetes prioritised. A DAHS general practitioner telephoned all Aboriginal patients aged 15–25 years with a recorded glycated haemoglobin (HbA_{1c}) ≥ 39 mmol/mol (5.7%) and last known to be living in or near Derby (n=20), with uncontactable patients sent letters. Ten other patients with above-normal body mass index (BMI) were also invited to participate by DAHS, and the program facilitators invited people from their networks. Printed flyers were widely distributed and an electronic flyer was emailed to approximately 80 people from various local organisations. Community members did not have to participate in the research to attend the program.

Program

The pilot program ran October–December 2017 in the DAHS reception area from 5–6:30 pm over 8 weekly sessions at no cost to participants. Transport was available through DAHS. Healthy snacks were served. The program was designed with a range of Aboriginal community members including young people, DAHS staff and other key advisers (Seear *et al.*, submitted for publication). Sessions involved an exercise circuit, outdoor cooking, and education topics consistent with the DPP including stress management (see kams.org.au for program manual). Education (maximum 30 minutes) had a strong focus on practical skills for healthy eating and physical activity, and included graphic depictions of diabetes complications including dialysis. The pilot program was co-ordinated by a female non-Indigenous graduate research student living in Derby (author KS) and an Aboriginal male exercise physiologist from Derby with research experience with young people (author ML). ML designed the exercise circuit to accommodate a range of fitness levels, utilising some resources from the Aboriginal and Torres Strait Islander Women's Fitness Program (Canuto *et al.* 2012). Hip-hop music, including Australian Indigenous artists, accompanied the circuit. Nyikina Elders named the program, 'Maboo wirriya, be healthy'.

As with other health programs for young Indigenous people, young Aboriginal facilitators as role models were required (Malseed *et al.* 2014). Local young people had previously identified health education and Aboriginal staff to be important for them (Warwick *et al.* 2019). Derby has few Aboriginal health professionals, and group education by lay community members has decreased diabetes risk elsewhere (Galaviz *et al.* 2018). Male and female staff were required for gender-separated groups as advised by community members. Facilitators were ML and a Derby Aboriginal woman, both aged around 30 years. The female facilitator had experience in psychosocial support and group facilitation, not concerning healthy eating and physical activity, and was an active participant in local sports. ML attended at least part of every women's session and KS was present at all sessions providing practical support. Facilitators used a tablet device with information, resources and music.

Measures

Evaluation of the program and implementation was by mixed methods, gathering qualitative process data (ongoing feedback, observations, and semi-structured post-program interviews with participants and facilitators conducted by KS) and quantitative short-term outcome data (NIH Office of Behavioral and Social Sciences 2018). Implementation aspects including acceptability, appropriateness, feasibility, and sustainability were examined. The small initial pilot, to test and refine the program and delivery methods, was designed to precede a larger implementation of the refined program.

Simple forms assessing physical activity, food and drinks were devised with community members. This included quantifying pre- and post-program soft drink, fruit juice and fruit consumption and retrospective reporting of aspects of healthy eating (portions, water, vegetables, fatty foods). Physical measures (BMI, waist circumference, blood pressure) were to assess individual changes and combine with results from future programs. Participants were encouraged to have an adult health assessment including an HbA_{1c} test. Permission to access relevant information from participant healthcare records was requested, from 12 months before to 6 months after the program.

Participants who had completed the post-program assessment were contacted by KS by telephone for a brief 6-month follow-up, asking what they recalled and if changes they reported post-program continued.

Analysis

Post-program interviews were digitally recorded and transcribed by KS. The transcripts were coded to topic categories determined by the semi-structured interview schedule and analysed for content, and collated with written participant feedback, participant measures, attendance data, notes from observations and reflections during the program, and 6-month follow-up information. Collated data were presented and discussed with all authors. Implications for future program design and delivery were identified. The perspectives of the Derby Aboriginal researchers were prioritised.

Results

Participants

Seven women aged 18–38 years (median 21 years, IQR 19–25 years) and three men aged 23–37 enrolled in the research. Seven were aged 25 and under. All lived within Derby and were in paid employment. Two of those directly invited enrolled in the research and attended the program. Six other women attended (four with another participant) but did not participate in the research component. One participant reported having pre-diabetes, and two others had a recorded HbA_{1c} indicating lower-range pre-diabetes (39–41 mmol/mol, 5.7–5.9%). Other risk factors in the participant group included physical inactivity, family history of diabetes and BMI \geq 30. Apart from the participant with known pre-diabetes, others reported joining to improve health and fitness, rather than concern about diabetes. The female facilitator said participants told her they saw it as “a motivation to kick-start their change”.

Six of ten research participants (three females aged 18–24 years; three males) were available for post-program interviews, completed individually or in pairs. Four of seven participants who completed post-program interviews or checklists were available for 6-month follow-up interviews.

Acceptability and appropriateness

Facilitators received positive informal program feedback and several attendees stated it was good to have this program in Derby. During sessions, attendees spontaneously said they felt motivated to do more healthy things, and would come back and bring friends (although this rarely eventuated). Participant post-program feedback included, “*It’s a great program*” (Male 1) and “*I think it was really good, I enjoyed it, you know, for the times that I was there, I enjoyed it a lot*” (Male 2). There was also positive feedback from young women:

Interviewer: *Do you have any other comments, or any other advice?*

Female 1: *I dunno. I think it's a good program.*

Female 2: *Yeah, I, it's a good program.*

Female 1: *Because everyone needs to know about this, and it doesn't only happen here, but it happens everywhere, a lot of these people they just don't, no one cares about what they eat, what they do.*

Program attendance was inconsistent, ranging from one to five participants per week. One woman attended every week, and one man attended seven out of eight weeks. Strategies to increase future recruitment and attendance were identified with facilitators (Table 1).

Table 1. Changes for future programs to increase recruitment and attendance

What happened in the pilot program	What we would do next time
Sought participants to enrol in the research before the first program session	Focus recruitment efforts on encouraging interested people to attend an introductory information session, to find out about the program before committing in any way
Recruitment focused on research project, with detailed research information flyer (ethics approval requirement)	Recruit to health service program with simple program information flyer
Advertising focused on diabetes prevention	Advertising with substantial focus on general health and fitness, as well as mentioning diabetes
Flyer emailed to organisations and displayed around town	Vary recruitment methods including more visits to local organisations, local radio ads, more prominent advertising at DAHS and social media
Short recruitment period	Longer (6–8 weeks) recruitment period
Target age group 15–25 years	Target age group 15–40 years
Prospective participants encouraged to bring friends/family aged 15–25, if wanted	Encourage participants to try to bring friends/family of any age
Text message reminders about upcoming session	Motivational text messages between sessions, as well as reminders
Ran program October–December (hot and busy time of year)	Run program earlier in the year
Program held in evening to accommodate employed persons	Due to post-work fatigue and working late, run program in morning before work instead (with a healthy breakfast)

Most participants considered 8 weeks appropriate, but asked for repeat sessions for flexibility or exercise sessions twice weekly. The group format was welcomed, considered more enjoyable, interesting and encouraging than individual consultations.

The venue was acceptable, and the female facilitator felt the DAHS venue contributed to cultural safety. However, a bigger space or outdoors at a cooler time of year was preferred.

There was no ideal indoor space in Derby. Informal follow-up with women who expressed interest but did not attend, or who attended but did not return, attributed this to other commitments, tiredness, and childcare, rather than program-specific factors. Although children were welcome to attend, an optimal childminding area was not available.

As foreseen, female participants appreciated a female facilitator. A male co-facilitator was acceptable. Feedback indicated having local Aboriginal facilitators was appropriate and effective. The facilitators were seen as kind, encouraging, and welcoming.

He explains things in a calm way, in an understanding way. (Male 2)

That was a good choice, because she's a local, and everyone knows her I guess. . . And like they get taught about health in school but they don't, I guess when you're sitting in front of a teacher, you don't listen as much, you don't take it in. And you don't, like, I don't know, see the importance of what's being told, and how if we can, if we make these changes, how we can make a change for ourself, we won't be on dialysis, we won't, I don't know, we won't be obese. (Female 1)

The selected measures were largely seen as appropriate, including physical measures in private. Checklists for food and drink were suitable and provided useful information. However, physical activity questions were often incomplete.

It was very easy, especially from someone in my point of view that's often quite shy about reading and writing. The majority of the Aboriginal people, usually the quiet ones, have some kind of trouble with something. So it was easy to understand, you didn't use big words, or any complicated words. (Female 3)

Program components, reported outcomes and feedback

Participants stated they were happy with the program activities and resources, although limited availability of Indigenous-specific resources was noted. Participants reported a range of changes after attending, even after only two sessions, and learnt new information. The dialysis video and complications photos were unsettling for most but their inclusion was supported as reinforcing the importance of healthy lifestyles. Increased healthy eating knowledge and awareness was also highlighted by participants.

Female 1: *We realised that we live such—*

Female 2: *Our eating habits and—*

Female 1: *—yeah we live such unhealthy lives, not just us but like other people . . . I think just the major change is the food and just thinking about it, rather than just buying it.*

Another participant reported still checking nutrition panels when shopping 6 months after the program, not choosing items with more than 5% sugar.

You've got me being concerned about what I'm buying now, I just keep checking up that little table there at the back [nutrition panel on food labels] . . . I can see this program sort of opening eyes, opening the eyes of others, 'cos it gives you knowledge.

(Male 2)

Participants generally enjoyed cooking and found it useful. A woman who attended every session reported increased cooking frequency and skills, along with smaller portioning, which continued at 6 months. Facilitator feedback reinforced the importance of the comprehensive coverage of various aspects of healthy eating.

I think it worked well, I think the cooking and like the meal prep kind of hands on stuff's important, yeah 'cos that diet side of things kind of goes hand-in-hand with exercise, and a lot of people who exercise regularly don't necessarily know how to eat a healthy diet, so it's important that people know. (Male facilitator)

Participants reported changes including eating more vegetables, less fatty foods, smaller portions, more water, less soft drink, less fruit juice, and less other sugary drinks. At baseline, all participants consumed soft drink in the previous week. After the relevant session one young woman went from drinking soft drink most days as well as regular juice consumption to stopping sugary drinks completely. At the 6-month follow-up, she stated she only drinks soft drink occasionally (less than once per week), and no longer drinks juice. A male participant also reported ceasing sugary drink consumption during the program, after expressing surprise at sugar amounts, but could not sustain this.

Almost all participants had low pre-program physical activity levels. Participants gave positive feedback about the exercise circuit, including suitability for beginners. Some reported a brief increase in physical activity outside the program (commonly walking), but this was not sustained.

It motivated me, for a while, and then I just got so busy and then I prioritised other things other than doing my exercise, 'cos like it made me go to the jetty every day and walk that path. (Female 1)

Participating appeared to motivate diabetes screening for three participants. Only a male and female, both regular attenders, completed before and after physical measures. Limited other healthcare data were recorded for participants in the 6 months after the program.

Other consequences of the program

More than 100 people had contact with the project during the program's development and piloting, which helped increase diabetes awareness and consideration of prevention in this community. Participants reported sharing program resources and knowledge with others, and two women reported making changes to their children's food and drink consumption. The female facilitator also made healthy changes during the program with enhanced health knowledge through her facilitator role.

Feasibility and potential sustainability

With additional external resources associated with the research project and a small grant including set-up equipment costs (\$3500) and facilitator pay, the pilot program was feasible but difficult. The process informed a revised, comprehensive manual to guide future program delivery.

After the pilot, DAHS staff were enthusiastic about the program; however, DAHS could not allocate staff for the program in addition to or instead of their usual duties. There was interest from several other organisations regarding client participation and involvement in program delivery, which was obstructed by limited resources. The year after the pilot, DAHS began to integrate components of the program into its prison outreach activities. DAHS is also considering options to use the program with existing and planned programs at the high school, as well as with other programs at DAHS. We are continuing to actively seek funding to expand the program.

Discussion

This pilot program demonstrated acceptability and proof of concept of a primary care-based diabetes prevention program for younger age groups in a challenging setting. There are compelling arguments for expansion of these efforts. The program's simple and flexible structure aids opportunities to integrate program modules within existing activities, while

DAHS continues efforts to secure funding for wellness-focussed activities. Unfortunately, overstretched resources, which created barriers to program implementation into routine practice at DAHS, are common in ACCHSs (Liu *et al.* 2015) and other primary health care settings (Messina *et al.* 2017).

Despite recruitment and attendance difficulties, the pilot program reached some young people in the often-neglected post-school age group, a period of increasing chronic disease risk in this community. As we found, children can also benefit from healthy changes of participating parents. This program has potential to engage more young Aboriginal men in positive preventive health activities. A well-resourced study piloting an adapted DPP for men of colour in disadvantaged areas of New York City had approximately three to six participants at each program site (Walker *et al.* 2018). The participation of men in our resource and time-limited pilot study is therefore encouraging. In each study, once men were involved with the program they enjoyed and benefited from it.

Prevention programs require ongoing funding for sustainability (Firth *et al.* 2012) and enhanced uptake and outcomes over time. Delivering this program multiple times annually for several years is required to build further community support, normalise participation, overcome shame/embarrassment (Warwick *et al.* 2019), and allow flexibility for participants to stop and recommence, as has been accommodated in other interventions (Murphy *et al.* 2003; Vallesi *et al.* 2018). Over the first 19 months of a continuous weekly cardiac rehabilitation program at an ACCHS, attendance increased from an average of three participants per session to 33 (Dimer *et al.* 2013) and was thereafter sustained at average 38 around six years later (Vallesi *et al.* 2018). Our study provides a starting point with good prospects of success once funded.

For new prevention programs in settings overwhelmed with treating chronic disease, committed staff are essential. The DAHS exercise physiologist's involvement was crucial for achieving the pilot program. His health professional knowledge was combined with vital community knowledge as a local Aboriginal person. The facilitator roles are also central. Key features of success were delivering accurate information in a way participants understand, being friendly and supportive, and ensuring the program was culturally appropriate and enjoyable. The success of the female facilitator, who enhanced her own health knowledge to deliver the program, supports other findings that prevention programs need not always be run by health professionals (Galaviz *et al.* 2018). The detailed facilitator manual and centralised tablet-based resources increase the likelihood the program can continue with a range of local Aboriginal facilitators.

The reduced soft drink consumption and modest improvements in diet from this program, even with limited attendance, have important implications for diabetes prevention if sustained (Lindstrom *et al.* 2013), as even small weight reductions can decrease risk (Galaviz *et al.* 2018). Some changes were maintained 6 months later, while others were not. Reduced levels of lifestyle changes from post program to follow-up are common, including in the original DPP study (Knowler *et al.* 2002). Changes are more likely to be sustained with a continuing program that is part of more comprehensive community and organisational prevention approaches. The readier participation of employed persons in the pilot program, although there was interest from a range of community members, underscores that broad efforts to improve socioeconomic circumstances are also a vital component of prevention and management of diabetes and related conditions.

Evaluation of experiences and outcomes was limited by the small number of participants in the pilot program, which should be considered in light of it being the first step of an intervention in a disadvantaged setting (Rychetnik *et al.* 2002). Future delivery will enable further evaluation, including with additional young people aged 15–25 years and up to 40 years, the age until which diabetes is often considered young-onset (Lascar *et al.* 2018). While simple food and drink checklists were suitable and useful, physical activity measurement could be improved. Future programs could utilise brief assessments of physical fitness as an indicator of change in activity level. This would demonstrate improvements to participants and aid motivation to persist (Firth *et al.* 2012).

There are immediate opportunities to increase knowledge, skills and motivation for healthy lifestyles through supportive group programs such as this, which can contribute to diabetes prevention over time. While Derby is unique, our findings have relevance for prevention efforts in other low-resource settings. In particular, programs involving community direction, a committed local person, supportive facilitators, and relevant and enjoyable content are likely to be useful. Substantial, dedicated prevention funding over a long period of time is required.

Conflicts of interest

The authors declare no conflicts of interest.

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