Maboo wirriya, be healthy: Community-directed and evidence-based development of a diabetes prevention program for young Aboriginal people in a remote Australian town

ABSTRACT

Supporting healthy lifestyle behaviours is a key aspect of preventing type 2 diabetes which disproportionately affects disadvantaged groups from a younger age. Formative participatory research was undertaken to design a program for young Aboriginal people in a remote town in North West Australia with a high level of health needs and relatively few prevention initiatives. Focus groups and advisory discussions with Aboriginal community members were used to determine the nature of the program. The need for a comprehensive program was consistently expressed and limited healthy lifestyle knowledge and difficulties with healthy eating influenced by food environments were noted to be important. With guidance from the Derby Aboriginal Health Service, findings were integrated with previous international research evidence to develop a program tailored to local Aboriginal people aged 15–25 years and refine it after piloting. This 8-session program, ‘Maboo wirriya, be healthy’ involved an education component consistent with the US Diabetes Prevention Program and practical activities including group exercise. Changes to program structure and documentation were made after piloting for future use. The community-directed approach used in this study is vital to ensure relevance of localised chronic disease prevention programs in a range of settings.

KEYWORDS

Prevention; design; tailored intervention; Aboriginal health; type 2 diabetes; action research
INTRODUCTION

The increasing worldwide burden of type 2 diabetes has serious implications for individuals and populations (NCD Risk Factor Collaboration, 2016). The US Diabetes Prevention Program (DPP) and other large trials demonstrated that lifestyle modification can prevent or delay diabetes in people at high risk (Knowler, et al., 2002). The DPP has been successfully translated to various settings in the US (Ali, Echouffo-Tcheugui, & Williamson, 2012), including with Indigenous communities in the Special Diabetes Program for Indians (Jiang, et al., 2013) and the PILI ‘Ohana Project in Hawaii (Mau, et al., 2010). In addition to intensive strategies such as the DPP that target high-risk individuals, supporting healthy lifestyles among broader populations is also an important aspect of delaying or, ideally, preventing diabetes (NCD Risk Factor Collaboration, 2016). Other real-world interventions addressing healthy eating, physical activity and associated weight management have also been shown to reduce diabetes risk in a range of settings internationally (Galaviz, et al., 2018).

The obesogenic and diabetes-promoting environments cultivated in recent decades have a disproportionate effect on disadvantaged groups (Peeters & Backholer, 2017) including the development of diabetes at a younger age. Intergenerational lifestyle habits that increase chronic disease risk are influenced by factors including low levels of formal education, unemployment, overcrowded housing, and stress. For Aboriginal Australians, the relatively recent period since colonisation (230 years) has involved the systematic erosion of health and well-being with continuing impact resulting in historical and current trauma. As just one example of appalling health disparities, Aboriginal and Torres Strait Islander people younger than 40 have around four times the type 2 diabetes rate of non-Indigenous Australians of the same age (Australian Institute of Health and Welfare, 2014).

While acknowledging the immense influence of social determinants of health, there are considerable opportunities to foster healthy behaviours through enabling a crucial foundation of relevant knowledge and skills (World Health Organization, 1986). To best support young people,
more prevention research focused on their particular needs is required (Lanoye, Gorin, & LaRose, 2016; Lascar, et al., 2018). We undertook a systematic review of group or community interventions involving a diet and/or physical activity component, with Indigenous participants (including people aged 15–24 years) in Australia along with New Zealand, Canada and the US. Consistent with previous reviews (McNamara, Sanson-Fisher, D’Este, & Eades, 2011; Rice, et al., 2016), the results indicated there are a limited number of detailed reports of lifestyle modification interventions with Indigenous people and particularly few focused on young Indigenous people. Of 24 interventions meeting the inclusion criteria, seven were specifically intended for adolescents (Carrel, Meinen, Garry, & Storandt, 2005; Chansavang, et al., 2015; Huynh, et al., 2015; Malseed, Nelson, & Ware, 2014; Rinderknecht & Smith, 2004; Ronsley, Lee, Kuzeljevic, & Panagiotopoulos, 2013; Tomlin, et al., 2012), although two of these also included children aged 5–10 years (Carrel, et al., 2005; Tomlin, et al., 2012). None of the interventions were specifically targeted at young people aged in their late teens and twenties, with the possible exception of a program for pregnant women (Gray-Donald, et al., 2000). The mean age of participants was commonly above 40 years.

Our review also reflected that the involvement of local people during intervention processes, including in adapting programs to local cultures and needs, is critical for success in any context and increases the likelihood of sustainability (World Health Organization, 2009). Furthermore, local direction is part of ethical conduct in research with Aboriginal and Torres Strait Islander peoples (National Health and Medical Research Council, 2018) including the crucial principle of self-determination that in itself promotes health and well-being (Finlay, 2017).

The focus of this paper is on the community-directed creation of a diabetes prevention program for young Aboriginal people in the remote town of Derby, in the Kimberley region of Western Australia, which has a high prevalence of type 2 diabetes from early adulthood. This program was the first of its kind in this setting. Describing intervention development is a valuable aspect of implementation research (Hoddinott, 2015); specific results of the pilot program are reported elsewhere (Seear, Atkinson, Lelievre, Henderson-Yates, & Marley, Submitted for
The purpose of this formative research was to discover what type of prevention program would be suitable for young Aboriginal people in and around Derby; utilise community knowledge and previous research evidence to design a preliminary lifestyle modification program consistent with community preferences; and refine the program after testing in a small exploratory pilot.

**METHODS**

**Setting**

Derby is 220 km from the nearest town of Broome and approximately 2400 km from Perth, the state capital. Its population, including the nearby Mowanjum Aboriginal community, was 3300 in the 2016 census. Approximately half the residents are Aboriginal people and two thirds of these Aboriginal community members are aged younger than 40 (Australian Bureau of Statistics, 2016). The traditional owners of the Derby area are the Nyikina people, one of around 50 Aboriginal language groups that existed in the Kimberley prior to colonisation. Aboriginal people residing in and around Derby are also from various other Aboriginal language groups. Derby is a strong, close community valued by many people. While it is over-represented in health and social issues (Anderson, Bineham, Lockwood, Mukhtar, & Waenerberg, 2018), there are a number of Aboriginal organisations and community members working to improve their community’s well-being. However, there has been limited co-ordinated focus on encouraging healthy lifestyles and prevention of obesity-related diseases in Derby in recent years.

**Ethics approval and consent to participate**

This project was endorsed by the Board of Directors of the Derby Aboriginal Health Service (DAHS), which is an Aboriginal Community-Controlled Health Service (ACCHS), and was supported by the Kimberley Aboriginal Health Planning Forum Research Subcommittee. Approval for the study was granted by the Western Australian Aboriginal Health Ethics Committee (Human Research Ethics Committee reference: 724). Participants provided written informed consent. Persons aged 16 years
and over were able to provide their own consent and there was provision for younger people to choose to participate with parent or guardian consent.

**Research approach**

This project involved a partnership between DAHS and Kimberley-based health researchers. The non-Indigenous researchers (KS in Derby with oversight by JM and DA in Broome) sought involvement in intervention research to contribute to change using respectful processes that recognised their own role as outsiders and the authority of the community (Mc Loughlin, Hadgraft, Atkinson, & Marley, 2014; Smith, 2012). Two of the authors (LHY and ML) are Aboriginal people from Derby, working at DAHS, who guided the process and were also researchers in the study. Local involvement was crucial throughout this project while recognising and respecting the existing burden of multiple responsibilities for Aboriginal community members including DAHS staff (Smith, 2012). Processes were consistent with a participatory action research approach whereby involvement of the community and its health service were key in all stages of program development using a flexible and iterative method to create a co-designed intervention (Cornwall & Jewkes, 1995).

An Aboriginal Advisory Group, with other DAHS staff members, was also formed to help ensure cultural appropriateness and relevance of research and program design processes and other Aboriginal community members also provided ongoing guidance.

**Data collection**

As with previous research relating to successful culturally tailored lifestyle modification programs (Dimer, et al., 2013; Mau, et al., 2010) the structure of this program was largely informed by focus groups with community members. Through the DAHS research liaison officer, an information flyer was distributed to general practitioners, nurses and Aboriginal health workers seeking young people to participate in focus groups. The flyer noted the program was being designed for people aged around 15–25 years, with a focus on diabetes prevention among Aboriginal people. Some people aged in their late teens and early 20s were approached individually.
but, under the guidance of DAHS, it was most feasible to utilise existing groups formed for education or community activities in their usual location. This minimised logistical difficulties in convening participants with many competing demands, with DAHS staff advising that the existing groups were also more likely to be cohesive, which was an important consideration in the small town where people were known to one another. DAHS allocated an Aboriginal staff member to assist the Derby-based researcher. This DAHS staff member had experience in local research projects including studies involving young people and was very connected within the community; she identified and provided introductions to co-ordinators of existing groups. Co-ordinators discussed the project and focus group method with their group and ascertained if this was acceptable prior to the researcher attending. Individuals provided written informed consent. As part of inclusive community processes those who declined to participate in the focus group were welcome to observe.

Focus groups were conducted from February–August 2017. The main purpose was to gather information about what type and format of lifestyle intervention or program would be acceptable, appealing and useful for young people in this community. It was anticipated this would be an efficient way to gather a range of views, with the possibility of emergent consensus through discussion within the group. Written surveys utilised in other program development studies were not appropriate in this context, where low literacy is not uncommon. The focus group schedule was checked with Aboriginal community members including DAHS staff. DAHS staff advised that to inform program design it would be necessary to present options from which young people could choose.

In one focus group, with mostly young men, the main group facilitator was local Aboriginal exercise physiologist ML. He had previous experience conducting research involving young people and was well-known within the community (Warwick, Atkinson, Kitaura, Lelievre, & Marley, 2019). In other focus groups, involving mostly women, the facilitator was a female non-Indigenous graduate research student (author KS) who was known to some participants through community activities.
DAHS staff were invited to facilitate or co-facilitate other focus groups but were unavailable; DAHS were comfortable that KS would be a suitable facilitator.

Focus groups commenced with a general discussion about health and diabetes. The group facilitator provided information about type 2 diabetes, and prevention in reference to healthy eating and physical activity guidelines, and distributed relevant resources.

For each aspect of program design, groups were presented with sheets of paper with various options as well as blank pages for other ideas (Box 1). The options originated from reports of a range of relevant interventions and were further developed with Aboriginal community members, including different methods of addressing healthy eating and physical activity. Several studies in our systematic review addressed concepts related to social and emotional well-being as part of the intervention, including stress management as with the DPP (Dimer, et al., 2013; Jiang, et al., 2013; Mau, et al., 2010; Thompson, et al., 2008). Online format options were not feasible in this setting due to lack of home-based internet access for many residents and, although mobile phones are common, financial constraints often restrict cellular data use.

**Box 1: Focus group topics and options for participants**

<table>
<thead>
<tr>
<th>What should the program have in it?</th>
<th>How would you like to get the information?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning about physical activity</td>
<td>Posters</td>
</tr>
<tr>
<td>Doing physical activity in a group</td>
<td>Videos</td>
</tr>
<tr>
<td>Support for doing physical activity on own</td>
<td>Apps</td>
</tr>
<tr>
<td>Learning about healthy eating</td>
<td>Face-to-face</td>
</tr>
<tr>
<td>Cooking</td>
<td>Social media*</td>
</tr>
<tr>
<td>Trying healthy foods</td>
<td>Written information</td>
</tr>
<tr>
<td>Dealing with stress</td>
<td>Art/drawings*</td>
</tr>
<tr>
<td>One-on-one support</td>
<td></td>
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<tr>
<td>Group support</td>
<td></td>
</tr>
<tr>
<td>Blank pages: participants were encouraged to write or say a new category.</td>
<td></td>
</tr>
</tbody>
</table>

* Added during early focus groups and provided as an option in subsequent groups

Participants indicated their preferred program components and format using sticky notes, and could choose more than one option. The group facilitator was not directly watching while participants made their selections. Where participants were older than 25, they were asked to make
their selections based on what they thought would be suitable and appealing for people aged 15–25 years.

The group facilitator encouraged discussion of other details about the program. For example: What type and extent of healthy eating information is needed? What type of physical activity would be suitable? Who would you like to hear the information from? What sorts of things would make people want to go? How would we know if it’s working well?

We also utilised advice gained in semi-structured interviews with four Aboriginal men (aged 20–35) in this community who had successfully made substantial healthy lifestyle changes (Seear, Lelievre, Atkinson, & Marley, 2019). These interviews were conducted between November 2016 and January 2017 and included discussion of recommended ways to support healthy lifestyle changes in others.

Data analysis and program development

Focus groups and interviews with community members were digitally recorded with consent and transcribed. Transcripts were descriptively coded and analysed to summarise program preferences and recommendations from all participants (Saldaña, 2014) and program component preferences, indicated by sticky notes, were tallied for each group and collated with relevant findings from the transcripts. Other themes in the data pertaining to healthy behaviours were also identified. Focus group and relevant interview findings formed the basis for designing the program in collaboration with DAHS and other key Aboriginal advisors in the community. The pilot program was run and refined with the DAHS exercise physiologist (author ML) between October–December 2017. Researcher presence at all pilot program sessions was at the invitation of the program facilitators in a supportive, non-directive capacity. As in programs in other ACCHSs which included non-Indigenous staff, strong respect for participants and Aboriginal culture maintained cultural safety (Vallesi, Wood, Dimer, & Zada, 2018).
RESULTS

Focus groups participant characteristics

There were seven focus groups with a total of 32 Aboriginal participants (24 females, 3–8 participants in each group). Most participants were aged 16–17 years (n=15), with a further four participants aged 18–25. Other participants were aged up to approximately 45 years (n=13). A small number of non-Indigenous people also participated in the focus groups but the perspectives of Aboriginal people were prioritised and are reflected in the quotes below.

Program preferences and recommendations

In each focus group, community members consistently advised that a comprehensive program addressing health-related knowledge and skills was needed.

*Something you can go to, teach you what is healthy, maybe like some cooking lessons or something.* (Male, 17)

*Having a program like this where they more hands on is a good idea.* (Female, 18)

*I’m excited about it, I think it sounds really good, and yeah it does something meaningful you know.* (Male, 35)

Many focus group participants provided minimal verbal responses but did express their preferences through the sticky notes. Participants tended to indicate the program should include everything, with a variety of ways to receive comprehensive information. In particular, colourful visual information, videos, and face-to-face formats were preferred. Group physical activity was supported in all focus groups.

Participants in one focus group raised the idea of visually addressing dialysis in the program:

Female 1, age 26: *You can [show] someone that has diabetes and is struggling.*
Female 2, age 40s: . . . Even somebody from the actual dialysis unit, you know, show ‘em the actual machine . . . that way they can see, cos everybody talks about it, I don’t even know what it does . . .

F1: That could be motivating to make changes.
F2: Yeah, cos you’re actually seeing.
F1: If you bring a group of young people in and they see that happen, then—
F2: That’s the best way.

This was also consistent with interview findings about motivators in people who had made healthy lifestyle changes and their recommendations to encourage change in others.

I think sometimes it’s good striking fear into people. (Male, 23)

I think what we don’t do any more enough of is scare tactic. (Male, 33)

I think there need to be like resources as such that show, right this is what’ll happen if you continue down this path. You know, show them like the severe health problems and how much it, more or less, I guess will ruin your life . . . But also they need to see like the transformations and, you know, that it is possible.

(Male, 21)

Most focus group participants were female who consistently expressed a preference for single-sex groups. This was consistent with advice from other community members. The prospect of a suitable male program facilitator was generally acceptable to young women but ideally in conjunction with a female facilitator (or a female facilitator alone).

Importance of health knowledge and healthy environments

In the focus groups, it was apparent that health knowledge could be improved. Many participants stated they had not previously seen the Australian Guide to Healthy Eating. Participants often recalled a physical activity recommendation of 30 minutes per day but generally indicated that
information from current guidelines about accumulation and intensity was new to them. Most participants indicated some basic knowledge about diabetes, however no younger people perceived themselves to be currently at risk.

Although it was not able to be addressed in the current prevention program, it is notable that several focus group participants raised the issue of environmental influences on food consumption. This included the poor quality, lack of variety and higher cost of fresh fruit and vegetables in this remote town. Participants also spoke about availability and marketing of unhealthy foods.

_Just tell them to just stop bringing cool drink here._ (Female, 16)

_Just go to the shop and tell them [laughing] to put all the junk food away._

(Female, 26)

_Young people if they have money they won’t go home for a feed they’ll go to the shops, there’s cool drink, chips, have a snack, something before they go home, and what they have at home they don’t know yet._ (Male, 35)

Similarly, older focus group participants (e.g. aged 35–45 years) who were clearly concerned about the health of younger people also acknowledged their own difficulties with healthy behaviours in the town environment. Some participants in this older age range noted that this contrasted starkly with the healthiness of traditional Aboriginal lifestyles:

_I think more for young people to advise is I reckon more out bush, you know if they go out bush more they’ll be able to get all these nutrients and all that because of the country and again like I said it’s not just the food, it’s you going out to where you belong._ (Female, 42)
Interviewees who had successfully made healthy lifestyle modifications also elucidated the difficulty of change while prominent themes in these narratives underscored the importance of thorough health knowledge and support.

**Program creation and refinement**

It was noted the breadth of education topics preferred by community members was consistent with the Diabetes Prevention Program. There was a publicly-available model for culturally-relevant adaptation of the DPP: the PILI ‘Ohana Project’s PILI Lifestyle Program Phase 1, involving Indigenous people in Hawaii (Mau, et al., 2010). After discussions with DAHS staff, the PILI program facilitator manual was used as a starting point for designing the education component of the Derby program. The PILI adaptation successfully shortened the DPP curriculum from 16 sessions to 8, which DAHS staff considered advantageous for both participants and staff. While the PILI program was delivered over 12 weeks, the Derby program was designed to be run over 8 weeks. This was considered to allow suitable frequency of contact within resource constraints and sufficient duration for biometric changes (Hetherington, Borodzicz, & Shing, 2015).

From this starting point, extensive modifications were made to suit the local context and age group. This included advice from DAHS staff experienced in working with teens and younger adults that the education component should last no more than 30 minutes, which is less than many other programs; it was evident in focus groups with young people that this was a suitable limit to maintain attention. In addition to guidance from DAHS the structure, topics and ways of explaining information were checked with community members. The program content and structure was further refined with DAHS after piloting (Table 1). A program logic model was defined to guide ongoing evaluation (Figure 1).

Although focusing on healthy lifestyle changes, the program content recognised a holistic concept of health and the relationship between health behaviours and broader well-being. The diabetes education component of the local program was more substantial than other programs to meet the identified need for enhanced knowledge, including for young people with unknown
individual risk status within a high-risk population. Through her professional experience, a DAHS nurse concurred with findings that local diabetes awareness was not commensurate with the level of risk in this community and that diabetes complications may be motivating, and advised that there were benefits of using graphic depictions of these. Other information about healthy eating and physical activity was comprehensive but straightforward, concise and accessible to people with limited formal education and without English as their first language. Pictures, information in poster format and videos were used where possible. There was an emphasis on practical skills for everyday use.

The format of the education component enabled but did not require participant interaction. Disengagement from formal education is a substantial issue in this setting and local young people may be reticent in the context of a group education session. In addition to group support, there were opportunities for one-to-one support from the program facilitator directly before or after the program, consistent with focus group preferences.

Unlike the DPP and PILI, group physical activity was included in each session with the intention to be supportive and devoid of pressure. Hip-hop/rap music was purchased for the program to suit young groups, as advised by focus group participants and other community members. The program was not reliant on health professionals but was designed to be run by young community members. The program facilitator’s information, resources to show participants and music were centralised on a tablet device, a format well-suited to this age group. With a view to sustainability, the program had a replicable format (e.g. it did not require outings or guest speakers, although these could be incorporated).

The name ‘Maboo wirriya, be healthy’ was given for the program by Nyikina Elders (traditional owners and cultural and community leaders). Maboo wirriya (pronounced ‘WIDD-ee-yah’) refers to good holistic health and feeling good, and complemented a message in Nyikina language for young people doing this program: “Be healthy, this sickness [diabetes] can make you really sick.” While the overall health aspects of the program were reflected in its name, its
advertising included the program’s diabetes prevention purpose with an intention to reach people with diabetes-related concerns and raise awareness in others. However, Aboriginal people advised that “diabetes prevention” was a non-Indigenous term lacking local relevance; therefore, the purpose of the program was communicated as to “stop diabetes happening”.
Table 1: Education topics in the ‘Maboo wirriya, be healthy’ program following piloting

<table>
<thead>
<tr>
<th>Session topic</th>
<th>Components</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview</td>
<td>What is health</td>
<td>Aboriginal multi-dimensional concept of health.</td>
</tr>
<tr>
<td></td>
<td>Type 2 diabetes</td>
<td>Healthiness of traditional lifestyles.</td>
</tr>
<tr>
<td></td>
<td>Healthy eating guidelines</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Physical activity guidelines</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Looking after ourselves</td>
<td></td>
</tr>
<tr>
<td>Physical activity</td>
<td>What’s good about it</td>
<td>Addressed skills and knowledge for self-directed physical activity long-term.</td>
</tr>
<tr>
<td></td>
<td>How hard to do it (intensity)</td>
<td>Walking was encouraged.</td>
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<tr>
<td></td>
<td>How much to do</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Safety</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Getting past barriers</td>
<td></td>
</tr>
<tr>
<td>Healthy eating</td>
<td>Guide to Healthy Eating</td>
<td>The importance of portioning had been emphasised by interviewees who had made successful healthy lifestyle changes.</td>
</tr>
<tr>
<td></td>
<td>Portions</td>
<td>Provision of healthy snacks was well-received.</td>
</tr>
<tr>
<td></td>
<td>Healthy snacks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Getting past barriers</td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>What is diabetes</td>
<td>Video of local dialysis patient, complications photos.</td>
</tr>
<tr>
<td></td>
<td>What does diabetes do</td>
<td></td>
</tr>
<tr>
<td></td>
<td>How to stop it from happening</td>
<td>After pilot program, videos sourced to explain diabetes and gestational diabetes instead of facilitator needing to explain detailed medical-related information.</td>
</tr>
<tr>
<td></td>
<td>HbA1c tests</td>
<td></td>
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<tr>
<td></td>
<td>‘Passing on wisdom: Jason’s Diabetes Story’ video (WA Centre for Rural Health) was released after the pilot program and included for future programs.</td>
<td></td>
</tr>
<tr>
<td>Choosing foods and</td>
<td>Saving money on food</td>
<td>PILI ‘Ohana added ‘economics of healthy eating’, including meal planning, to DPP curriculum (Mau et al., 2010).</td>
</tr>
<tr>
<td>drinks</td>
<td>Meal planning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Label reading</td>
<td>Discussion about sugary drinks with reference to World Health Organization sugar intake guidelines, measuring sugar in drinks activity, video by Victorian Aboriginal Community Controlled Health Organisation and Rethink Sugary Drink.</td>
</tr>
<tr>
<td></td>
<td>Sugary drinks</td>
<td>Advertising tricks, food industry (Bryan et al., 2016).</td>
</tr>
<tr>
<td></td>
<td>Alcohol</td>
<td></td>
</tr>
<tr>
<td>Cooking</td>
<td>Good things about cooking</td>
<td>LiveLighter and Food Sensations (including Deadly Tucker) recipes, requiring only camping stoves.</td>
</tr>
<tr>
<td></td>
<td>Food safety</td>
<td></td>
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<tr>
<td></td>
<td>Healthy swaps</td>
<td>The pilot program involved multiple cooking sessions; reduced as part of streamlining program.</td>
</tr>
<tr>
<td></td>
<td>Making it easier</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cooking activity</td>
<td></td>
</tr>
<tr>
<td>Stress</td>
<td>Sleep</td>
<td>Body scan meditation (audio file).</td>
</tr>
<tr>
<td></td>
<td>Stress</td>
<td>Facilitator-led progressive muscle relaxation.</td>
</tr>
<tr>
<td></td>
<td>Breathing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mindfulness meditation</td>
<td>Affirmations were added to revised program (e.g. I enjoy my culture and learn more, to be stronger; I have high and low days but I don’t give up).</td>
</tr>
<tr>
<td></td>
<td>Muscle relaxation</td>
<td>Local referral options (mental health and social and emotional well-being).</td>
</tr>
<tr>
<td></td>
<td>Where to get help</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Physical activity, nature</td>
<td></td>
</tr>
<tr>
<td>Keeping it going</td>
<td>Program summary</td>
<td>Problem-solving is a key component of the DPP.</td>
</tr>
<tr>
<td></td>
<td>Getting a health check</td>
<td>DAHS staff highlighted the importance of resilience.</td>
</tr>
<tr>
<td></td>
<td>Goal setting (realistic and achievable)</td>
<td>Apps were mentioned regularly throughout the pilot program. This was not as useful as anticipated and focus was reduced in revised program.</td>
</tr>
<tr>
<td></td>
<td>Problem-solving</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Useful apps</td>
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</tbody>
</table>
An important modification after the pilot program was completed was arranging education plans and resources by topic, rather than intended week of delivery, to better accommodate sporadic attendance and enable flexibility in delivery. Changes in information for program facilitators were also made after the pilot to reliably guide future delivery of the program. While such manuals are commonly used in other programs, the pilot program showed it can be difficult for facilitators to remember or follow a session manual with relatively new information or ways of structuring information while ensuring a casual, fun atmosphere. The revised program included a detailed program facilitator manual providing necessary background information to be used during preparation and additional information slides on the tablet to prompt facilitators to state key messages at the session (Seear, 2018). The clear and culturally relevant ways that program facilitators explained information in the pilot program were incorporated into the revised facilitator manual. Researcher observations and participants’ questions during the pilot program also...

Figure 1: ‘Maboo wirriya, be healthy’ logic model including longer-term evaluation plan
contributed to the revised program. As some participants sought detailed explanations, additional non-essential information was included in the revised manual for reference if needed.

**DISCUSSION**

Interest in a proposed prevention program from a range of community members underscored the need for more prevention opportunities in this town, as has been found in other international settings with a high diabetes burden (Brown, et al., 2010; Ho, Gittelsohn, Harris, & Ford, 2006; Mau, et al., 2010). The ‘Maboo wirriya, be healthy’ program created from community preferences is consistent with the DPP and other related programs. A more streamlined approach that could be employed in various other settings is to first undertake a preliminary adaptation of the DPP education topics in collaboration with key local advisors. This could then be presented more widely to community members as a starting point for designing a complete program. Following initial co-design the program facilitators and graduate research student found piloting the program to be an invaluable part of the program’s development, although labour-intensive. It is anticipated the program will continue to evolve with future use.

The local program is enhanced by: group physical activity as part of every program session; an applied, streamlined education component, including cooking; and powerful information about diabetes for increased awareness and potential motivation for healthy behaviours. Of concern, is the apparent underestimation of risk among young people in this community, consistent with findings elsewhere (Kowall, et al., 2017), which may be an important factor in choices about intentional healthy behaviours (Rosenstock, 1974). Advice from community members to employ ‘fear tactics’ was consistent with Elder guidance and is supported by recent literature. Fear-inducing messages regarding health issues can modify attitudes and behaviours, if the issue is perceived as both sufficiently threatening and within the person’s ability to control (Blonde & Girandola, 2016; Tannenbaum, et al., 2015). Accompanying details about the seriousness of diabetes and depictions of complications, and encouraging participants to consider this a personally relevant priority, the program includes repeated clear messages about how to prevent diabetes.
Designing the program to be run by a range of community members contributed to its cultural appropriateness, whereas some programs require facilitators to have specific qualifications to be approved to run the program. This is not viable in the Kimberley due to workforce and resourcing constraints, and regardless would currently require reliance on a transient non-Indigenous health workforce (Gwynne & Lincoln, 2017). A focus on developing the health facilitation skills of local Aboriginal people is consistent with key priorities in Aboriginal health (Department of Health Western Australia, 2015). It has been clearly demonstrated that programs run by lay community members can produce cost-effective beneficial outcomes (Ali, et al., 2012; Galaviz, et al., 2018; Li, et al., 2015). This program was particularly intended to be run by young Aboriginal community members, which enables peer support and role modelling (McGavock, Dart, & Wicklow, 2015; Mellor, McCabe, Ricciardelli, & Tyler, 2016) as well as increasing the likelihood of suitability and enjoyment for a young participant group. Having an Aboriginal program facilitator who is able to speak with participants as a peer, including using the word “we”, contributes to the supportive environment of the program and can avoid guilt and defensiveness that may adversely affect the impact of health messages (Agrawal & Duhachek, 2010).

Other culturally appropriate features of this program included running separate program sessions for males and females with a gender-matched facilitator, which has also been a preferred format for other Indigenous women (Canuto, McDermott, Cargo, & Esterman, 2011; Thompson, et al., 2008). The program manual encourages facilitators to incorporate their own cultural knowledge, as an Aboriginal person, into the program. While much of the hip-hop music local young people listen to comes from the United States, Australian Indigenous (Aboriginal and/or Torres Strait Islander) hip-hop artists were purposefully included in the program playlists; many of these songs feature themes of cultural pride and resilience.

Publicly-available program manuals (particularly the PILI ‘Ohana Lifestyle Program) were valuable in providing an example of structure, content, and adaptations for the Derby program. In turn, the current program’s facilitator manual was made publicly available (via kams.org.au), which
may assist others to develop localised diabetes prevention programs for young Indigenous people in different communities in Australia and internationally.

In designing this program, it was evident that it is easy to obtain inaccurate healthy eating information, particularly for people with limited formal education and digital health literacy. We took great care in framing straightforward and accurate healthy eating information and selecting resources. For example, many existing resources have an emphasis on packaged foods and white flour products. High standards, clear logic and consistency in information endorsed by reputable institutions would aid public acceptance of fundamental nutrition knowledge (Katz, et al., 2018). Discussions with community members also highlighted the potential for enhanced communication of essential healthy eating and physical activity national guidelines.

The current research highlighted that well as supporting healthy lifestyle choices in individuals, policy action to aid widespread health improvements is needed. The marketing, availability and costs of food and drinks influence their consumption (Swinburn, et al., 2015); community members noted these factors in reference to the difficulty of being healthy. At an even more basic level, actions to ensure sufficient standards of living for all are a crucial part of supporting good health globally.

Limitations of this study included difficulty in recruiting participants for the focus groups. A traditional focus group process of organising individuals to attend was not practical in this setting and with this age group. Although it was useful using existing groups, these groups were often small due to fluctuating attendance. Other efforts to convene potential focus groups over a six-month period were obstructed by a lack of group availability, key contacts changing job roles or having unexpected leave and, finally, prospective group members who were too young or predominantly non-Indigenous. It is possible a higher number of participants may have been recruited if short individual interviews with young community members was sought (Cha, Crowe, Braxter, & Jennings, 2016). Even so, this approach would not necessarily have enhanced communication.
Lessons Learned

Younger participants (particularly teenagers) were often quiet during focus groups, which may have been due to shyness and/or reluctance to share opinions. However, using sticky notes to indicate preferences during focus groups removed focus from the individual and was, therefore, an effective strategy, including for identifying a need for stress management. This method may be useful as part of planning future programs with young people; sticky notes could be used more extensively throughout a focus group to gather additional information (Peterson & Barron, 2007). We also recommend consideration of other relatively anonymous ways to gather input from young people while still utilising opportunities to increase participants’ awareness and knowledge. As well as collaborating directly with younger people, we found the insights of other local Aboriginal people with extensive knowledge about the younger age group to be useful. It is, nevertheless, vital to enable young people to guide initiatives which are intended for them (Checkoway, 2011).

The contributions of DAHS staff were valuable and essential in this research but their time was constrained by other urgent health service priorities. The Aboriginal Advisory Group formed for this project was highly important but did not go as planned due to staff movements and busy schedules. It was more feasible to meet with Aboriginal advisers individually for short periods and include both DAHS staff and people from other organisations. This transition from the more structured arrangement was aided by increased familiarity between researcher and advisers. These challenges are not unique to the current project and reinforce the importance of flexibility and a willingness to adapt to local needs in all stages of health research (Jamieson, et al., 2012; McLoughlin, et al., 2014).

CONCLUSION

With community direction throughout this research, our process of creating a localised diabetes prevention program resulted in a culturally appropriate and relevant intervention adapted to the needs of young people. This program and the process by which it was developed may be useful in the development of future interventions tailored to a range of other communities. It is
important to gather information from young people in a way that suits them, as well as utilising the guidance and insights of other community members. There is a clear need for broad policies that facilitate healthy lifestyles. With time and sustained effort, there is also scope for far more actions to support healthy behaviours at the community level for prevention of chronic diseases.

ABBREVIATIONS
DAHS: Derby Aboriginal Health Service
DPP: Diabetes Prevention Program (United States)

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