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The Effect of a 12-Week Exercise and Lifestyle Management Programme on Cardiac Risk Reduction: A Pilot Using a Kaupapa Māori Philosophy

Abstract

Introduction: Cardiovascular disease remains the leading cause of premature death and disability for all New Zealanders. Māori, the Indigenous people of New Zealand, are disproportionately affected. The New Zealand Māori Health Strategy recognises that "health and wellbeing are influenced and affected by the 'collective' … and the importance of working with people in their social contexts, not just with their physical symptoms" (Ministry of Health, 2002, p. 1). In a Māori worldview, a holistic approach to health is innate. ***Objectives:*** This project piloted a kaupapa Māori approach within an existing 12-week clinical exercise and lifestyle management programme. The aims of the study were to determine the effectiveness of a kaupapa Māori 12-week exercise and lifestyle management programme on parameters of cardiac risk and quality of life. ***Methods:*** 12 Māori participants attended, 3 times per week over a 12-week period, for monitored, supervised, and individualised exercise. Participants performed a progressive aerobic-only programme for 6 weeks and then a combined aerobic and resistance training programme from weeks 7 through 12. Education sessions were chosen by participants. ***Results:*** There was a statistically significant improvement in waist circumference (–3.7 cm; p = .05), hip circumference (–4.6 cm; p = .03), systolic blood pressure (–22 mm Hg; p = .01), and HDL cholesterol (0.22 mmol/L; p = .01). In addition, physical (p = .05) and overall (p = .03) quality of life improved. ***Conclusion:*** A kaupapa Māori approach within a structured lifestyle management programme modifies cardiac risk parameters in Māori.

Keywords

Cardiovascular disease, kaupapa Māori, exercise, interface space

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Introduction

Cardiovascular disease (CVD) remains the leading cause of premature death and disability for all New Zealanders, accounting for 30% of deaths annually (Ministry of Health, 2010). Māori are disproportionately affected by CVD, which is the principal reason for the difference in life expectancy between Māori and non-Māori (Chan et al., 2008; Wells, Broad, & Jackson, 2006). Life expectancy at birth is 76.5 years for Māori women and 72.8 years for Māori men, compared with 83.7 years for non-Māori women and 80.2 years for non-Māori men (Ministry of Health, 2014). Innovative approaches, focusing on prevention and management of CVD and using principles associated with a Māori worldview, are required to improve CVD outcomes and life expectancy for Māori.

Kaupapa Māori is an accepted framework for health research in Aotearoa/New Zealand and is underpinned by critical theory. Māori beliefs and values are placed at the centre of the research process and findings are applied based on Māori views of the world. Māori health is holistic, considering more than just the physical aspects of a person, and a number of Māori health models exist (Durie, 1998; Durie, 1999; Pere & Nicholsan, 1997). The most commonly referenced model is Mason Durie's (1998) *Whare Tapa Whā*. The model is symbolised as a *wharenui* (meeting house) with the four walls of the *whare* (house) representing the four dimensions of Māori health: *Taha hinengaro* (mental health), *Taha wairua* (spiritual health), *Taha whānau* (health of the family), and *Taha tinana* (physical health). Each wall is essential for the strength and symmetry of the whare, and as such each dimension of health must be balanced for an individual to be well. In this regard, the New Zealand Māori Health Strategy, *He Korowai Oranga* (Ministry of Health, 2002) recognises that "health and wellbeing are influenced and affected by the 'collective' as well as the individual, and the importance of working with people in their social contexts, not just with their physical symptoms" (p. 1).

Exercise as an intervention in disease prevention and management is well accepted, and evidence to support its use for CVD continues to accumulate (American College of Sports Medicine, 2014). Cardiorespiratory fitness has an inverse relationship with premature death from all causes, but especially from CVD (Kodama et al., 2009; Sesso, Paffenbarger, & Lee, 2000), and high levels of fitness are associated with higher habitual levels of physical activity and exercise (Wang et al., 2010). Exercise is also known for its ability to reduce CVD risk through changing risk factors, including reductions in systolic and diastolic blood pressure, increased high-density lipoprotein cholesterol (HDL-C), decreased triglycerides, reduced total body fat including abdominal adiposity, reduced insulin need, improved glucose tolerance, and reduced platelet adhesiveness and aggregation (Kesaniemi et al., 2001; Nelson et al., 2007). Poor nutrition has a definite role in the development of CVD, and therefore evidence-based guidelines

highlight the importance of including nutritional education and support within a primary prevention framework (Lichtenstein, 2006). Of particular interest also is quality of life (QoL), as it is known that cardiac disease is associated with reduced QoL (Jette & Downing, 1994) and that individuals who participate in traditional cardiac rehabilitation programmes have improved QoL (Hevey et al., 2003). Specific CVD risk factors such as hypertension and high cholesterol are also related to reduced QoL (Kannan, Thompson, & Bolge, 2008).

Traditional exercise-focussed CVD programmes are based on a medical model of service provision, usually located within an inpatient setting and having a rehabilitative emphasis. These types of programmes have not incorporated a Māori worldview, have limited Māori access and participation, and do not service primary prevention. Kaupapa Māori research approaches have been utilised in community CVD projects which support the use of a Māori worldview within public service programmes (Peiris et al., 2008; Pitama et al., 2011). In addition, in New Zealand, Toi Tangata (an agency that aims to inform, educate, and advocate about wellness for Māori at government level) advise the Ministry of Health regarding Māori approaches to nutrition and physical activity and have encouraged particular kaupapa Māori–based approaches to heart health, thereby addressing some of the issues around medical modelling of service. The Heart Guide Aotearoa (Eadie & Tane, 2010) programme and the associated "Heart Coaches" have provided a Māori-centred approach, with a home-based cardiac rehabilitation programme that suits the Māori worldview more closely than other primary and secondary services. However, the Heart Guide Aoteoroa is a defined rehabilitation programme following a cardiac event and therefore does not service a population with CVD who have not had a cardiac event.

Using a kaupapa Māori research methodology, this project pilots an approach whereby an intervention programme for Māori is created within an "interface space" (Durie, 2004). The interface space recognises both Māori ways of being and the Western medical model, taking aspects of both to produce an intervention that has the best of both worlds. An overarching kaupapa Māori process ensures that Māori are involved in all aspects of the project, including planning the methodological approach, critiquing the way that findings are presented, and guiding dissemination.

The overall purpose of the project was to pilot a kaupapa Māori approach aimed at reducing the risk of a first cardiac event by reducing factors that contribute to that risk. The specific aim of the pilot project was to determine the effectiveness of a 12-week exercise and lifestyle management programme, embedded within a kaupapa Maori philosophy, in relation to parameters of CVD risk and quality of life. The results relevant in the Western medical world are reported here.

Methods

The kaupapa Māori methods are explained briefly here; in-depth description can be found elsewhere (Rolleston, Doughty, & Poppe, 2016). The methods and findings in this paper conform to a Western medical and academic reporting framework.

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Twelve participants were recruited from a kaupapa Māori healthcare service and by word of mouth. Inclusion criteria were Māori with more than two CVD risk factors (New Zealand Guidelines Group, 2012) and no previous cardiac event history. Exclusion criteria were previous myocardial infarction, previous stroke, unstable angina pectoris, hypertrophic cardiomyopathy, decompensated heart failure, symptomatic aortic stenosis, and severe pulmonary hypertension (Balady et al., 1998).

Participants were informed about the project both orally and in writing and had the opportunity to bring *whānau* (family) to an initial meeting so that the research could be explained fully. It was at this meeting that participants and their whānau were able to build the programme structure and embed Māori values and philosophies. The "interface space" ideal allows for clinical outcomes while still using a kaupapa Māori overarching approach. All processes were agreed upon by participants prior to commencement.

Participants attended an exercise physiology facility for a pre-programme assessment. The assessment included measurements of body weight, waist circumference, hip circumference, forced vital capacity (FVC), forced expiratory volume in one second (FEV_1; Cardinal Health Micro-Gold standard), resting blood pressure (average of three measurements over 5 minutes), fasting total cholesterol (TC), and HDL cholesterol (CardioChek PA). The point-of-care CardioChek PA system has good accuracy compared to clinical diagnostic laboratory methods and has reasonable compliance for coefficients of variation and bias measurements (Panz, Raal, Paiker, Immelman, & Miles, 2005). Body mass index (BMI), waist to hip ratio, total to HDL cholesterol ratio, and rate pressure product (RPP) were calculated.

A quality of life (QoL) questionnaire was administered. The questionnaire was designed specifically for use in this study because during the consultation phase, participants did not think the two validated questionnaires suggested adequately measured QoL from their worldview. The questionnaire was developed using the validated tools SF-36 (Turner-Bowker, Bartley, & Ware, 2002) and WHOQOL Spirituality, Religiousness and Personal Beliefs (WHOQOL-SRPB Group & Skevington, 2006) as guidelines and was written in plain, New Zealand English. It contained 10 questions under each of the following sections: (a) physical, (b) mental and emotional, (c) stress, (d) life enjoyment, and (e) overall quality of life. The questionnaire is non-validated by Western medical standards.

In addition, participants performed a graded exercise ECG test (GXT) on a treadmill using XScribe ECG system (Mortara Instrument Inc.) and the modified Naughton treadmill protocol (American College of Sports Medicine, 2014; Starling, Crawford, & O'Rourke, 1982). Blood pressure, heart rate, and rating of perceived exertion were recorded in the final 30 seconds of each stage. Findings from the GXT were used to prescribe the first day of exercise for each participant.

Participants were prescribed an exercise programme specific to their needs but attended the clinic as a group, three times per week over a 12-week period. Exercise sessions were monitored and supervised. Exercise prescription conformed to the American College of Sports Medicine guidelines for cardiac populations and was dependent on the initial fitness level,

cardiac risk profile, and mobility of participants (American College of Sports Medicine, 2014). Participants performed a progressive aerobic-only programme for the first 6 weeks and then commenced a combined aerobic and resistance training programme from weeks 7 through 12. Blood pressure, oxygen saturation (Edan H100B), and heart rate (Polar FT2) were measured before aerobic exercise, midway through exercise, and 5 minutes after exercise. During weeks 1 through 6 participants performed aerobic-only exercise on two different pieces of exercise equipment and measurements were recorded on both apparatus. In addition, during exercise, participants were asked for their rating of perceived exertion (Borg, 1982).

At week 6 participants provided either a written or oral 3-day diet recall. Those who gave oral accounts did so in an interview-type manner, with a member of the research team, who asked for clarification on various aspects of their diet such as quantities of food consumed, brands of products, timing of meals, and cooking methods. Written accounts were also subject to clarification questions and additional information was added to the original written account. Formal nutritional analysis of diet recalls with appropriate software was not performed. Recommendations given were based on an informal, visual assessment of the information by the lead researcher. Common recommendations were to increase vegetable and fruit intake, reduce refined carbohydrates, increase water, and swap energy-dense foods (pies, bakery foods etc.) for less dense, more nutritious choices.

Lifestyle change education was provided at agreed intervals throughout the 12-week programme. Participants decided on the areas of education that they wanted in the programme, when education sessions would be held, the venues for the sessions, and who would attend. For example, a cooking demonstration was agreed upon and facilitated by a local health provider who worked with cooks at a local *marae* (traditional complex for meeting and cultural purposes); it took place in the kitchen of a local Māori nursing service. Interestingly, when participants were offered education about Māori-specific topics like *rongoa* Māori (Māori medicines) and Māori models of health, the group declined the offer and instead chose topics typically covered in the usual 12-week care programme. The education sessions were nutrition with a cooking demonstration, yoga for stress management, practical breathing mechanics, exercise for health (classroom based), and stress management.

On completion of the 12-week programme, participants underwent a post-programme assessment identical to the pre-programme assessment described above, performed at the same time of the day and under the same medication conditions. In addition, an informal gathering with participants was held after the completion of the programme, and a semistructured focus group analysis of the 12-week programme was performed, directed by the participants. Findings from the semistructured analysis are not reported here.

Figure 1 illustrates the difference in structure between the usual care and kaupapa Māori 12-week programmes for interest only, as this was not a controlled trial comparing these programmes.

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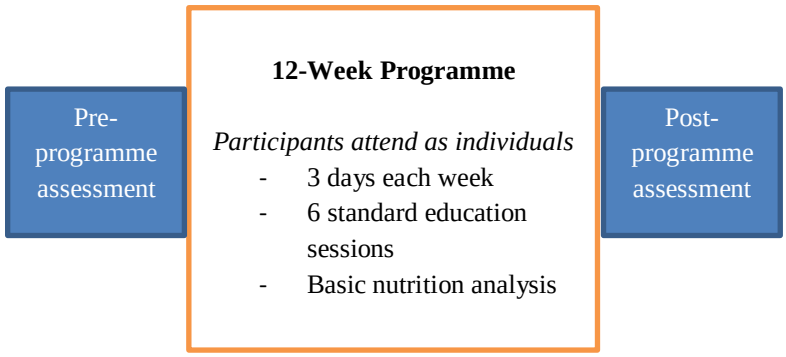
(a) Usual 12-Week Care Programme



(b) Kaupapa Māori 12-Week Programme

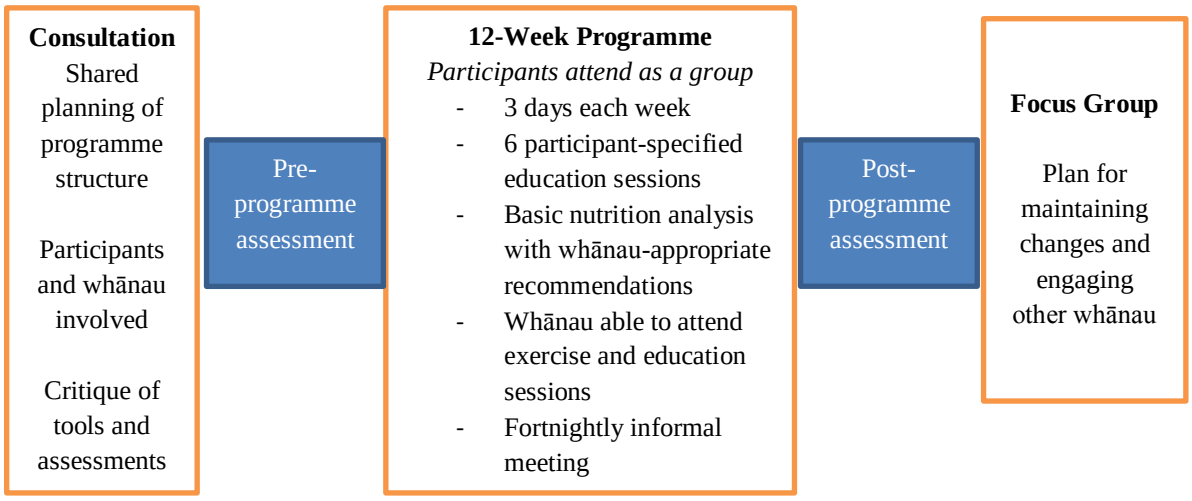


Figure 1. **The usual care programme (a) is based on a Western medical structure. The kaupapa Māori 12-week programme (b) is the product of consultation with Māori stakeholders and participants.**

Statistical Analysis

The difference in individual participant measurements before and after the 12-week programme was assessed using paired Student *t* tests. The relationship between statin use and cholesterol, and between systolic blood pressure (SBP) and use of blood pressure medication, was assessed using unpaired Student *t* tests. The Shapiro-Wilk test confirmed *t* tests were suitable for these data. Analyses were performed using R statistical software v3.0.0 and statistical significance declared when $\alpha \leq .05$.

Results

Twelve participants started the programme and nine completed (six male, three female). Two participants were commuting together into the clinic and when one stopped attending due to

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childcare issues, the other found it difficult to get up in the mornings when she didn't have someone she was expected to meet, and dropped out as well. The third participant dropped out midway through the programme when an alteration in her working hours made it difficult for her to attend with the other participants and she was reluctant to come outside of that time, despite the option being available to her.

The mean age of participants was 51.5 (*SD* 12.4) years. Participants were not involved in regular physical activity or structured exercise prior to enrolment in the study and had not undertaken any measures to modify their lifestyle to manage their cardiac risk factors. One participant was not taking any prescription medication upon enrolment in the study. All other participants were taking at least two prescription medications. Medication type and dose remained constant over the 12-week period. Seven out of nine participants were taking at least one blood pressure medication (beta blocker, ACE inhibitor, or diuretic), four out of nine participants were taking an anticoagulant, and three out of nine participants were taking a statin for lipid-lowering therapy. In addition four out of nine participants were taking diabetes medication for glucose management. All participants had been taking their prescribed medication for at least 3 months prior to enrolment in the 12-week programme. Statin use did not affect the change in cholesterol over the 12-week programme (total cholesterol, $p = .36$; TC:HDL-C, $p = .30$); however, no reduction in blood pressure was observed in the two people that were not taking a blood pressure medication.

Table 1 presents the pre- and post-programme results. There was a 3.1 kg reduction in weight, although this difference did not reach statistical significance. There was a statistically significant reduction in both waist and hip circumference. On average, there was a significant reduction in SBP that was reflected in a significant reduction in resting RPP. HDL-C significantly increased during the programme, and there was a nearly significant trend toward a reduction in total to HDL cholesterol ratio. There was no significant change in lung capacity as measured by FVC and FEV_1.

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Table 1
Physical Results Before and After 12-Week Programme

	Pre-12-week programme	**Post-12-week programme**	**Mean difference**	***p***
	Mean ± *SD*		**[95% CI]**	
Weight (kg)	122.3 ± 37.1	119.1 ± 30.6	–3.1 [–7.7, 1.5]	.16
Waist (cm)	116.7 ± 20.8	113.0 ± 18.9	–3.7 [–7.3, –0.1]	.05*
Hip (cm)	131.2 ± 20.4	126.6 ± 18.1	–4.6 [–8.8, –0.5]	.03*
Waist:hip ratio	0.88 ± 0.07	0.89 ± 0.07	0.003 [–0.03, 0.03]	.80
SBP (mm Hg)	151 ± 16	130 ± 19	–22 [–37, –6]	.01*
DBP (mm Hg)	94 ± 7	93 ± 8	–1 [–7, 5]	.73
RPP	11061 ± 1806	9628 ± 2091	–2238 [–3903, –573]	.01*
Total cholesterol (mmol/L)	4.41 ± 0.94	4.16 ± 0.79	–0.25 [–0.82, 0.31]	.33
HDL-C (mmol/L)	0.88 ± 0.28	1.11 ± 0.40	0.22 [0.06, 0.38]	.01*
Total:HDL ratio	5.34 ± 1.70	4.31 ± 1.77	–1.02 [–2.06, 0.03]	.06
FVC (L)	3.31 ± 1.22	3.50 ± 1.20	0.16 [–0.40, 0.37]	.10
FEV_1 (L)	2.57 ± 0.93	2.68 ± 0.89	0.11 [–0.07, 0.29]	.18

Note. SBP = systolic blood pressure, DBP = diastolic blood pressure, RPP = rate pressure product, HDL-C = high-density lipoprotein cholesterol, FVC = forced vital capacity, FEV_1 = forced expiratory volume in 1 second
* Statistically significant difference between pre- and post-12-week programme

QoL findings are presented in Table 2. Overall QoL improved as a result of participation in the 12-week programme. This change appears dominated by the physical component. The other areas tested were not significantly different before and after the 12-week period. Interestingly, one participant had a reduced QoL score at post-programme testing. The participant had quit cigarette smoking 3 weeks prior to the end of the study and was having substantial issues with maintaining his smoke-free lifestyle.

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Table 2
Quality of Life (QoL) Results Before and After 12-Week Programme

	Pre-12-week programme	**Post-12-week programme**	**Mean difference**	***p***
	Mean ± *SD*		**[95% CI]**	
Physical	24.4 ± 4.5	27.4 ± 4.8	3.00 [0.07, 5.93]	.05*
Mental and emotional	25.1 ± 3.2	26.2 ± 3.7	1.11 [–1.93, 4.15]	.42
Stress	26.9 ± 4.6	28.3 ± 4.6	–1.40 [–1.05, 3.94]	.22
Life enjoyment	31.0 ± 4.5	32.2 ± 3.3	1.22 [–1.6, 4.07]	.35
Overall QoL	37.8 ± 4.6	41.4 ± 4.0	3.67 [0.54, 6.79]	.03*

* Statistically significant difference between pre- and post-12-week programme

Limitations

Limitations were inherent in this pilot. Sample size was small, and although statistically significant improvements in several CVD risk factors were demonstrated, the true magnitude of the benefit remains uncertain and needs to be examined further in a larger study.

Physical activity level prior to and during a follow-up period after the 12-week programme was not measured. Physical activity measurements, or an objective measure of cardiorespiratory fitness, in a subsequent study would be helpful in determining improvement in activity levels as a result of participation in the programme and also sustainability of activity levels after completion, both in the short and long term. In addition, nutritional aspects of lifestyle management were not measured and a dietary analysis before and after the 12-week programme would provide information about the value of the nutrition education provided. The structure and content of the QoL questionnaire resulted from the Māori consultation process, and as such the final questionnaire used was not validated as defined by Western science. However, part of the overall purpose of the pilot programme was to consider new assessments appropriate for Māori research. Further validation will be undertaken with the questionnaire in a subsequent study.

The design of the programme content and the ability of Māori within the consultation process to manage and modify the design implies that a subsequent study based on the same philosophy will have some differences compared to this pilot. A project embedded within a kaupapa Māori philosophy that has produced findings that are significant for Māori health has never been retested with a new group of Māori participants to determine if similar findings occur with alterations in methods. A project with a larger sample is therefore currently in trial phase (NZHF Grant #1648). A larger sample will mean more participants involved in the consultation process, and there are likely to be methodological challenges associated with the expectation that the group function as a collective. The subsequent study is therefore essential for extending our

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knowledge about whether a successful programme that has integrated Maori and clinical worldviews, in a small population, can be extended to a wider population.

Discussion

This pilot project using Durie's (2004) "interface space," ideal within a 12-week exercise and lifestyle management programme, was successful in improving a number of important parameters of CVD risk. SBP, waist and hip circumference, and HDL cholesterol were significantly improved by the intervention with a trend for a reduction in total to HDL cholesterol ratio. In addition, physical and overall quality of life improved.

Reducing the risk of a first cardiac event is achieved by a modification in parameters that contribute to that risk. Hypertension affects at least one in four adults worldwide (Kearney et al., 2005), and there is a continuous and logarithmic relationship between hypertension and cardiovascular disease risk (Ezzati, Lopez, Rodgers, Vander Hoorn, & Murray, 2002). A reduction in SBP therefore contributes to a reduced risk of CVD and a first cardiac event. SBP was markedly reduced for participants in this pilot study. A low HDL cholesterol level is an established and independent predictive risk factor for CVD, supported by a variety of evidence from epidemiological studies (Assman, Cullen, & Schulte, 2002; Cziraky, Watson, & Talbert, 2008). HDL increased over the 12-week intervention period from an average that was below the recommended level of > 1.0 mmol/L to within the recommended range for reducing CVD risk (0.88 ± 0.28 mmol/L pre-programme to 1.11 ± 0.40 mmol/L post-programme). Previous research has demonstrated that waist circumference effectively identifies individuals at risk of CVD across different BMI categories (Janssen, 2002). Waist circumference fell by an average of 3.7 cm over the 12-week intervention period. Despite the average waist circumference still being above the recommended circumference for both men and women after the intervention period, any improvement is positive in terms of risk reduction (Janssen, Katzmarzyk, & Ross, 2002). When a 3.7 cm reduction in waist circumference is combined with a reduction in SBP and an increase in HDL cholesterol, the overall outcome is a reduced risk of disease and cardiac events.

Lack of physical activity is a CVD risk factor (American College of Sports Medicine, 2014). Physical activity level was not determined prior to participants' enrolment in the 12-week programme, and therefore a comparison of activity level before and after the 12-week intervention cannot be made. However, participants were not involved in structured exercise prior to the study and anecdotally were not active upon enrolment. An assumption can therefore be made that the programme was able to modify a fourth factor contributing to CVD risk—physical inactivity. Anecdotal reports indicated that participants found the first few weeks of exercise difficult but enjoyed the regular sessions once they had "created a habit."

QoL is integral in wellness research, and measuring QoL fits well with the holistic Māori model of health. Poor QoL is linked to issues of mental health, and subsequently poor mental health is linked to long-term conditions such as CVD and diabetes (Katon, Lin, Russo, & Unützer, 2003; Kilbourne et al., 2009). It is also known that individuals with cardiac disease

report poor QoL (Jette & Downing, 1994). The relationship between improved QoL and improvement in measures of CVD risk is not well established. However, with a holistic view of health in mind, the improvement in both physical and overall QoL in this project is a positive finding and contributes to the overall strength of the programme for a Māori population. The participants were given the ability to structure the programme to suit their worldview, and they made a collective decision not to use either the SF-36 or the WHOQOL-SRPB tool to measure QoL because they felt neither reflected that worldview. The QoL questionnaire developed in collaboration with Māori stakeholders, participants, and their whānau was a novel process for the research team but provided *tino rangatiratanga* (the ability to self-determine) for Māori, within a society driven by Western perspectives.

Having influence over the process of health gives people ownership and builds trust where previously there may have been disempowerment and a perceived paternalistic relationship between health provider and patient. Choosing the content and mode of delivery of education sessions also provided participants with the ability to self-determine. In this way, participants identified what was important to them to learn about health instead of a standard programme delivery of set education determined by the health provider. Exercise programmes were tailored to the individual, but participants attended exercise sessions as a group. The whānau collective has been identified as a fundamental component of a Māori worldview and attending exercise as a collective, despite individual exercise prescriptions, is an illustration of how the interface between science and *mātauranga* Māori (Māori knowledge and wisdom) works in practice.

The information gained in this project serves the Western ideals of science and knowledge but also allows for a Māori worldview and does much to alleviate the mistrust felt by Māori of historical research that has privileged Western science and knowledge.

The purpose of this pilot was to use an interface space concept to integrate a Māori worldview with clinical components to modify CVD risk in a population that is disproportionately represented in CVD morbidity and mortality statistics. Interestingly, giving the participants control over the content and structure of the programme did not produce a 12-week iteration that was too dissimilar to the usual care condition (Figure 1). It is therefore perhaps the acknowledgement of culture that is fundamental in this process and the ability to self-determine health and feel as if there is partnership with a healthcare service.

Conclusion

A 12-week exercise and lifestyle management programme, embedded within a Māori philosophy, is a low-cost intervention that is capable of changing a number of CVD risk parameters: SBP, waist circumference, HDL, and physical activity in this instance. An intervention that can modify a number of cardiac risk parameters over a period of weeks could be a better way of managing CVD risk than modification of parameters one at a time. A study with a larger sample would be required to make concrete recommendations and also to assess

adherence, which was relatively easy with a small cohesive group but may be more difficult with a larger number of participants. Long-term maintenance of lifestyle management also needs to be assessed in a comprehensive manner to ensure positive changes are not reversed.

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