THE USE OF EXERCISE PHYSIOLOGY IN THE ADVANCEMENT OF MĀORI WELL-BEING

The application of kaupapa in lab-based research

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Abstract

Type-2 diabetes and other illnesses associated with a sedentary lifestyle have a high prevalence among Māori. While the application of knowledge from exercise physiology, a specific discipline of the health sciences, could be used to enhance Māori health aspirations, Māori-led research in this field is relatively uncommon. Exercise physiology seeks to understand physical performance and the relationships between fitness, body composition, health and illness. Rarely have the key tenets of exercise physiology been applied to Māori populations. This paper discusses the application of, and interface between, kaupapa Māori methods of research and those traditionally used in exercise physiology. Specifically we discuss the application of four kaupapa—rangatiratanga, wairuatanga, whanaungatanga and manaakitanga—in a lab-based setting. The paper concludes that exercise science has the potential to bridge Indigenous and Western approaches to research, informing both the prevention and the treatment of lifestyle illnesses that impact significantly on Māori communities.

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Keywords

research methodology, exercise science, Māori health, Indigenous health services, exercise, physical

Introduction

Epidemiological studies paint a grave portrait of Māori health in New Zealand. Being confined to modern lifestyles, Māori are more sedentary when compared to our pre-European progenitors. These changes, and the consumption of modern foods, have led to a disproportionate prevalence of lifestyle illnesses associated with clustering of cardiometabolic risk factors now referred to as metabolic syndrome (Chew, Gan, & Watts, 2006). Similar trends can be seen in other developed countries such as Australia and the United States, where the Indigenous peoples of these nations also exhibit disproportionately high rates of type-2 diabetes and cardiovascular disease (Gohdes, 1995; Moore & Lunt, 2000; Young, Reading, Elias, & O'Neil, 2000; Zimmet, 1979).

Adequate physical activity and a healthy diet are highlighted as the most important ways of maintaining health, reducing the effects of lifestyle illness, and enhancing overall well-being (Fox, 2007; Penedo & Dahn, 2005). Accordingly, the role of physical activity in the prevention and treatment of illness has been researched extensively at physiological, epidemiological and sociological levels. Exercise physiology is the study of how physical activity interacts with systems and processes within the body. As such, this branch of science provides a tool to further our understanding of lifestyle illnesses and the role exercise plays in overcoming these illnesses.

Despite the value of this discipline in helping us to understand health and illness, the participation, involvement and exposure of Māori to studies of exercise and health at a physiological level have been limited. Although some may argue that lifestyle illnesses afflicting Māori are predominantly a result of socio-cultural issues, overall wellness is likely achieved through the interaction of both environmental and physiological factors (Daniel, Lekkas, & Cargo, 2010; Daniel, Lekkas, Cargo, Stankov, & Brown, 2011). Thus, considering the role of exercise in achieving overall well-being, understanding responses to exercise intensity, type and duration, all of which fall under the realm of exercise physiology, would benefit Māori in our aspiration for health and overall well-being. However, it is essential that the design, approach and application of knowledge gained from research is conducted and conveyed in culturally appropriate ways.

Worldviews and varying life experiences influence the way in which people, whether they be qualitative researchers, quantitative researchers or, indeed, the study participants themselves, perceive and approach all aspects of life. Therefore, assuming that a particular research approach deemed appropriate for Western audiences will also be accepted by and appropriate for Māori may lead to ethical concerns while also affecting the relevance and utility of subsequent research findings. Although often well intentioned, a "one size fits all" approach to research can limit the potential of a study by reducing the likelihood of Māori acceptance and therefore participation in such research (Tuttle, 2002).

A period of decolonisation, politicisation and education, which continues today, has led to Māori seeking greater control in the research process, evidenced by the emergence of Māori-centred research approaches and methodologies (Cunningham, 2000; Smith, 2000); the growth of Māori theoretical, conceptual and explanatory frameworks (Durie, 1985; Kara et al., 2011; Morgan, 2007; Ratima, 2001); and

the exploration of the notion of an interface between mātauranga Māori and Western science (Edwards, 2010; Hudson, Roberts, Smith, Tiakiwai, & Hemi, 2012).

Despite the commonplace use of kaupapa Māori research approaches and practices in a range of health research contexts, the application of kaupapa Māori views and values in specific scientific settings, such as lab-based human studies, remains limited. Considering the value of exercise physiology in achieving overall wellness for Māori, the following review will discuss not only the merit of exercise science in the study of Māori health, but also the way in which research methods from exercise physiology can be carried out under the guidance of kaupapa Māori values. The paper therefore advances knowledge in the field in two ways: by contributing to the paucity of academic writing that discusses the inclusion of Māori cultural values in lab-based settings (Cheung, Gibbons, Dragunow, & Faull, 2007), and by discussing the potential of exercise science to bridge reductionist and holistic views on health. Furthermore, we hope this paper inspires the development and implementation of similar approaches to a range of scientific research conducted in New Zealand.

A Western approach to health science

The research approach of biological and physiological sciences traditionally follows a reductionist view, seeking to understand behaviour by breaking specific scientific units, or concepts, into even smaller parts. In health, a reductionist view seeks to explain illness by understanding the cellular pathogenesis associated with the condition and applying a treatment to this. For example, the modern biomedical approach to type-2 diabetes research may compare differences in cellular function between a healthy person and an unhealthy person. Whilst this type of research may improve understanding of the cellular mechanisms responsible for disease, solutions to such problems are often found through the development and application of a pharmaceutical treatment rather than a population-based health approach which focuses on lifestyle modification. Pharmacological approaches to lifestyle illness may be beneficial to some people, such as those incapable of physical activity (for example, para/quadriplegics); however, for others, such as those with major depressive disorder, pharmaceutical solutions are no more effective than the prescription of whole body exercise (Blumenthal et al., 1999). Furthermore, many pharmaceutical interventions are usually used at the detriment of other bodily systems (Doggrell, 2006; Stannard & Johnson, 2006), while exercise at even a modest level has positive effects upon physical health as well as other aspects of overall well-being (Penedo & Dahn, 2005).

The high prevalence of lifestyle illnesses (for example, type-2 diabetes, cardiovascular disease) among Māori means that many rely on medications such as statins (a class of drugs used to lower cholesterol levels) to maintain health. While we recognise that pharmaceuticals can be truly lifesaving, we would also argue that the reliance on these medications, many of which come with no plan for cessation, can in fact negatively impact Māori by impacting both their ability to be self-determining and their capacity to live a healthy lifestyle that reflects Māori holistic views around health and well-being. This is particularly the case when individuals and whānau faced with a diagnosis of type-2 diabetes have not been made aware of, or supported in accessing, alternative methods to regain and maintain good health through, for example, diet modification or exercise.

An additional barrier to Māori acceptance of scientific research methods is what Harris and Mercier (2006) observe as science's disregard of spiritual knowledge and Indigenous values and its dismissal of spiritual explanations for scientific phenomena. Although Western

science exists as a vehicle to understand the unexplained, a clear distinction can be drawn between Western science and Indigenous understanding. Because Indigenous knowledge includes a spiritual component and is based on a different set of values, it is often branded as irrelevant to scientific knowledge. However, there is a growing recognition amongst scholars that Indigenous knowledge and traditional ways of knowing can be considered as expressions of sciences in their own right (Haverkort, Millar, Shankar, & Delgado Burgua, 2012). Science in its purest and most basic sense is not just the chemistry, physics and biology we have come to associate with "fundamental" sciences, but is defined as knowledge, whether obtained through the usual scientific methodology of observation, experimentation and theory, or not (Harris & Mercier, 2006). As Ahuriri-Driscoll et al. (2007) argue, Indigenous knowledge and science are not in fact irreconcilable. Nevertheless, the dismissal on the part of science of spiritual knowledge and Indigenous values can act as a barrier to Māori acceptance of scientific research methods.

A Māori approach to health science

In contrast to the reductionist view applied to health in traditional physiological research, Māori take a more holistic view. A Māori approach recognises the link between all levels of social, psychological and biological health, understanding that if one element changes, the others are also affected. According to this view, the characteristics of well-being cannot be understood by focusing on each component separately (Andersen, 2001). Similarly, the World Health Organization (WHO) defines health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (Breslow, 1972). The Māori view of health expands on the WHO definition by emphasising the importance of spiritual well-being as an aspect of overall health and vitality; an aspect of health Durie recently articulated as Mauri Oho (Durie, 2014). Contemporary Māori health models such as Te Whare Tapa Whā (Cram, Smith, & Johnstone, 2003; Durie, 1985), Te Wheke (Love, 2004), and Te Pae Māhutonga (Durie, 1999) have been developed to express this wider, more encompassing view Māori have of well-being; a view shared by other Indigenous peoples globally (Durie, 1994; Smylie, Anderson, Ratima, Crengle, & Anderson, 2006).

In addition to the importance placed on spiritual well-being, Māori consider health in a collective sense, recognising that if an individual within a whānau is in poor health, the whānau as a whole suffers (Durie, 1994). Western health systems and Western science, however, have generally taken an individualistic approach to health, which is often reflected in the design of research seeking to address a health concern. The focus by traditional Western science on the individual combined with the lack of awareness of the importance of whānau, and an inability to incorporate concepts of holism into scientific inquiry, all contribute as barriers which hinder Māori involvement in lab-based health studies (Durie, 2004).

While science has passed up many opportunities to gain from the knowledge of Indigenous groups, it could be argued that until recently, Māori have underutilised the opportunities provided by science to help achieve Māori aspirations. Exercise physiology, the scientific discipline dedicated to understanding how our bodies' structures and functions are altered when exposed to acute and chronic bouts of exercise, may provide a medium whereby Māori health aspirations can be met and Māori methodologies applied.

The contribution of exercise physiology

As a discipline, exercise physiology follows the scientific method of observation,

experimentation and theory, but tends to be more holistic in its approach and objectives when compared with other physiological areas of study. This more holistic approach is particularly apparent when considering the body of literature dedicated to understanding the impact of exercise on a variety of health and well-being measures—from mental health and sociology, to sleep and nutrition studies. For example, exercise training has been shown to impact on all aspects of well-being (Fox, 2007; Penedo & Dahn, 2005); have a therapeutic effect upon those suffering from anxiety, depression and sensitivities to stress (Salmon, 2001); and often provides, in the case of group exercise, a forum for social interaction. Considering these points, exercise physiology could prove valuable in advancing Māori health aspirations while also providing a bridge between two seemingly conflicting approaches to research: the scientific approach and an Indigenous approach. At the end of the day, research for Māori needs to make sense to Māori (Durie, 1994). Because exercise science retains an integrated approach which requires an understanding of the whole "body" (tinana, wairua, hinengaro, and whānau) and its response to exercise, its application often appeals to those that are inexperienced in scientific research.

The so-called lifestyle diseases, such as type-2 diabetes and heart disease, are exacting a heavy toll on the Māori population. The Ministry of Health's recent report into the burden of disease notes that, of the specific conditions causing the greatest health loss among Māori, coronary heart disease and diabetes feature in the top five (Ministry of Health, 2013). Understanding the role of exercise in the maintenance of well-being for Māori is critical, as is the need for culturally appropriate exercise science and research. Understanding the physiological aspects of exercise as they relate to Māori will allow us to better understand the volume and type of exercise that is most appropriate, and whether exercise requirements differ between ethnicities, in New Zealand at least.

Nevertheless, physiological aspects of Māori health and exercise are only part of the solution to reducing the burden of lifestyle diseases on Māori as a population. Equally important is our understanding of the wider socio-economic and socio-cultural factors that impact exercise. For example, identifying barriers to healthy lifestyles such as cultural preferences to exercise and motivation for exercise will aid in the translation of research findings to more suitable lifestyle interventions for Māori. To amass the best evidence of what will work for Māori, the inclusion of both quantitative and qualitative research methods and tools is essential, which necessitates greater collaboration between researchers from a variety of disciplines.

The interface

Māori researchers have posited that Western scientific research and kaupapa Māori research are not necessarily mutually exclusive (Durie, 2004; Reid, 1999; Smith, 1999). Researchers have argued that it is possible within a Māori analytical lens or framework to address a research question of concern to Māori, using positivist, reductionist techniques and tools (Ahuriri-Driscoll et al., 2007). However, as Bishop (1998) notes, at all times Māori researchers must be cognisant of the purpose of the research question and whether it is Māori who benefit directly from the research activity.

As discussed earlier, research with Māori will not succeed if studies are designed in a "non-Indigenous" manner. Many methodological and theoretical advances that have been made recently have emerged as a consequence of Māori researchers working at the interface between mātauranga Māori and Western science philosophies of knowledge (Durie, 2005; Edwards, 2010; Mercier, 2013); between ethics and tikanga (Hudson & Russell, 2009); or simply between Western scientific approaches and kaupapa Māori approaches to research design (Boulton, 2005).

How then do we conduct research at the interface between Western science and a kaupapa Māori approach? In 2004, our group commenced a series of laboratory studies which investigated the role of aerobic fitness on diabetes risk in Māori men. These studies, which continue today, focus on the measurement of physiological markers such as maximal aerobic capacity (VO_2max) and body composition, and the role these play in predicting diabetes risk via blood pathology. Another study has focused on the impact of exercise training on subjective markers of well-being. The fact that the research has a Māori health focus provides our group with an opportunity to incorporate kaupapa Māori values into our research design and investigate the interface between lab-based human studies and a kaupapa-based approach. Although kaupapa Māori approaches have been discussed, developed and utilised in a number of research settings, its application in a lab-based setting was, we believed, an important innovation. The lab-based studies we outline below provided a unique opportunity to identify areas of our research design which could be enhanced by kaupapa, while allowing reflection on the learnings obtained in the process. Although the application of kaupapa identified in the following examples are far from comprehensive, we hope that the practices we use can provide a foundation for future advancement in this area.

Rangatiratanga

Perhaps the most important kaupapa to consider in the research context is that of rangatiratanga, a theme synonymous with Māori aspirations for self-determination and leadership. In Durie's (1999) model for Māori health promotion, Te Pae Māhutonga, rangatiratanga is expressed as "Te Oranga", which calls for participation and leadership of Māori in education, economy, employment and decision-making. Smith (1999) refers to rangatiratanga when observing that Māori desire greater participation in, and control over, what happens to us in research practice.

Since the first colonisers reached Aotearoa and began "researching the Māori", Māori have been subjected to unethical, unsound and culturally insensitive practices by research institutions and "well-intentioned" researchers. To this end, Māori experiences with research have been negative largely due to study designs which undermine rangatiratanga. Values, aspirations and concerns of Māori have been minimised or entirely disregarded in place of personal interest, gain, publicity, and career and institutional advancement (Bishop, 1998; Smith, 1999). Recent examples of institutions and researchers failing to meet the needs of Māori populations they were researching suggest that the undermining of rangatiratanga, and therefore the Treaty of Waitangi, continues (Blundell, Gibbons, & Lillis, 2010). One American researcher, speaking of a failed research project she ran within a Māori community, wrote that, "Inherent in this concept [of self-determination] is the full collaboration, not just cooperation, of the target group in all phases of a project's design, implementation and evaluation" (Tuttle, 2002, p. 17). Tuttle suggested that researchers should be willing to share, or if necessary, relinquish project leadership to those directly affected by the research.

Research led by Māori from conception through to implementation will likely be more relevant, acceptable and beneficial to Māori aspirations, and reflect the needs of those communities directly impacted. Accordingly, strategies such as He Korowai Oranga and Te Whakatātaka, which were developed by the Ministry of Health as part of a framework for the public health sector to follow in its support of Māori communities and whānau, have identified the need for Māori involvement in all aspects of Māori health (Ministry of Health, 2002). Nevertheless, Māori remain underrepresented in most professions in the health sector, including scientific research (Curtis & Reid, 2013; Curtis, Wikaire, Stokes, & Reid,

2012; Wikaire & Ratima, 2012). Thus, in order to fully utilise exercise physiology, there must be more Māori trained in this discipline and a greater understanding of Māori values among non-Māori researchers and institutions (Harris & Mercier, 2006). Māori leadership in this area will likely have a positive influence on building and restoring Māori trust in scientific research (Walker, 1998).

Our studies

Those who have observed our group's studies have witnessed the rare scene of Māori as participants in a battery of physiological tests, but also as research team members responsible for the conceptualisation, design and execution of the study. Whereas it may be commonplace for research participants in physiology studies to visit the lab on a given "testing day", be introduced to the lab setting and the researcher, and participate in the "tests" with barely more than small talk offered, the superficial relationship described here is the antithesis of what we aim for in our work. In our studies, the relationship between researcher and participant is a top priority. Participants are regarded as whānau in both a figurative sense, through our actions to make them feel welcome and invested in the work, and a literal sense, given many participants have whakapapa links to the research team.

Rangatiratanga as a value was evident in our work with our Māori participants in a number of ways; for example, participants were encouraged to provide feedback and input into aspects of the study, such as the timing of "testing" sessions and the exercises used during exercise training sessions. Other examples include participant input into the dissemination of results, one of which was a workplace Māori exercise group that met twice a week for whānau-based exercise sessions to ensure a degree of continuity for participants post-intervention.

Participation in our studies was seen as a valuable contribution of time, effort and energy, and was treated as taonga: a contribution to the research and wider Māori communities. Participants were encouraged to ask questions at all stages of the research. While we believe that our emphasis on participation as taonga had a positive impact on participants, it also had an impact on the research team, focusing the objective of the study directly on Māori aspirations and advancement, rather than the researchers' own aspirations.

Wairuatanga

Wairuatanga, which encompasses spiritual aspects of life, is not normally part of lab-based studies or mainstream health research, but cannot be ignored if the research is to be successful among Māori. While the incorporation of wairuatanga could include karakia which acknowledge the role of the "unseen" in all aspects of life, wairuatanga also encompasses feelings of confidence, self-esteem and environmental connectedness; it is not limited to one's religion or relationship to God or deity (Durie, 1994; Foster, 2009).

Our studies

In our studies, expressing wairuatanga requires that we make the lab setting one where a participant's welfare is of paramount importance. We felt beholden to ensuring that those who entered the lab entered a place of safety. It also required that we perform some visible and deliberate tasks. Specific actions which upheld our understanding of wairuatanga included, for example, performing karakia prior to and following research sessions. In offering karakia we acknowledged the need for divine direction and protection while we as research team members undertook various research protocols. We observed that offering karakia in the laboratory directed the energy of research team members to be more motivated and focused on the tasks they were required to perform during study

sessions. As Māori we know that conducting pōwhiri, whakatau and mihimihi are culturally accepted ways of bringing together two groups. In our case, where the two groups included researchers on one hand and participants on the other, adherence to ceremonial traditions, such as mihi whakatau, were important means of acknowledging the purpose of the research, while also providing a forum to share thoughts and opinions. These traditional practices were essential activities within our study, and in a way, transformed the traditionally clinical and "cold" setting of an exercise laboratory into a setting that was more familiar and culturally safe for Māori participants. Performing these simple activities also strengthened the resolve of researchers to focus on the aspirations of our participants and Māori as a whole, rather than some separate research agenda.

Whanaungatanga

Whanaungatanga is defined by Mead (2003) as being concerned with relationships, kinship and sense of connection, and by O'Carrol (2013) as the process of attaining and maintaining relationships, where people collectively socialise and engage in enhancing their relationships. Brannelly, Boulton, and Te Hiini (2013) observe that the act of making personal connections through shared genealogy and getting to know someone else is one of the most important rituals observed when Māori meet and that making these connections in a clinical setting is just as important to provide a basis for new relationships to be forged.

Our research team takes the position that whanaungatanga can be upheld in the laboratory or scientific research setting by incorporating common Māori protocols such as welcoming visitors, sharing kai, and establishing whakapapa linkages. Such activities, while not usually performed in a lab, are a standard part of Māori interactions. Whereas mainstream science gives primacy to objectivity and therefore exhorts the lab-based scientist to leave emotions and subjectivity at the door when undertaking research, our view is that by building connections with participants, we will end up with more robust research output. Therefore, we do not hold to the belief that the personal touch will somehow taint the quality of the research and its results; rather, to our research team it seemed odd to treat participants as anything less than distinguished guests, friends and whānau.

Our studies

Participants in our study were invited to take part in the research as part of a group of friends or whānau, rather than as individual participants undergoing a research procedure alone, as is typically the case in scientific studies. While none of our participants chose to bring non-participating whānau with them during the research process, many interested in participating spread the word to family members, friends and teammates, and subsequently, testing sessions were conducted in groups made up of brothers, cousins and teammates. Although no qualitative assessment of the research experience was made, it was easy to "feel" the difference between these testing sessions and the countless sessions we as a team conducted with non-Māori groups in the past. Laughter, banter, and discussion about family connections are not usually part of the laboratory experience, but were commonplace during our testing sessions and, in reviewing the results of our studies, did not detract from the scientific rigour required to perform robust research.

A further example of whanaungatanga in this study was apparent in our desire to share a meal with participants, usually at a restaurant, the night prior to lab sessions. Typically hosted by the lead researcher, these meals gave the participants time to "connect" with the researcher, and the researcher with participants, and for participants to get to know each other (if not already acquainted). These opportunities for whakawhanaungatanga enabled all involved

to establish links between individuals and their whānau, whether it be through ties to iwi, a particular rohe or whakapapa. Kai has always been an integral part of bringing two groups of people together and transitioning those who were previously strangers to becoming family and friends. While having a "decent" kai with participants seemed a simple thing and commonplace to us as Māori researchers, this is far from normal practice in lab-based research.

Manaakitanga

Boulton and Brannelly (in press) define manaakitanga as the act of providing support, hospitality, protection and care, noting that it is not only a fundamental value in Māori culture but that as a concept, it provides clear guidelines for how people should be treated. As researchers, we are recipients of time and effort given by the participants and their whānau and have a responsibility to treat them with care and respect. Thus, in keeping with the ideals enshrined in the concept of manaakitanga (which emphasises reciprocity, showing gratitude and supporting one another) it is our responsibility as beneficiaries of a participant's sacrificed time and effort to reciprocate the kindness shown, whether it be through hosting meals, the provision of accommodation and transport during aspects of the study, or other koha.

Our studies

Research suggests that data collected "on" Māori and other Indigenous groups are often not disseminated back to the groups or communities from which they come (Smylie et al., 2006). In contrast, findings from our studies were distributed to participants and adequate explanation was given regarding the implications of findings. It was obvious that participants appreciated our honesty and patience in explaining the implications of results, but these discussions went beyond just reporting. Participants were eager to have direction on how to improve their own and their families' health, highlighting the importance of a solution-focused and mana-enhancing approach to dissemination. Disseminating research findings to the appropriate individuals, organisations, communities and collectives is in itself an expression of manaakitanga and recognition of the intellectual property that has been gifted to the study by our participants and their whānau. Therefore, the principles of manaakitanga must in turn underpin the approaches adopted in reporting and disseminating results.

Research findings are frequently written up to produce scholarly articles, which then fill academic journals so that academics can quote findings back to other academics. However, these same findings may never actually make it out into communities where ethics committees, research funders and community members are assured they would be most useful. For example, one significant finding of our study for Māori communities is that, for Māori at least, aerobic fitness of an individual correlates with insulin sensitivity and diabetes risk independent of body fatness (Stannard, Holdaway, Sachinwalla, & Cunningham, 2007). This finding suggests that regardless of weight and the amount of body fat one has, being fit may protect from diabetes and other metabolic disorders.

As a consequence of this unexpected finding we have established two exercise groups who meet twice a week to do physical activity in a whānau-like setting. The focus of these exercise groups is not upon losing weight, but rather about enhancing well-being and health through regular physical activity. These groups, facilitated by the lead researcher, provide opportunities for research participants who have completed our studies to continue some degree of peer-supported physical activity. Our facilitation of these sessions and ongoing contact with participants is a way we as a research team express manaakitanga to our participants and reciprocate the time and effort given by participants.

Future directions

Ideally, future research of this kind would be performed in the rohe of the research participants, utilising marae or other culturally significant locations, rather than having participants come to a somewhat foreign location such as a university laboratory. While constraints posed by a lack of expertise limit such an approach at present, advancement in portable apparatus, the identification of interested communities and a commitment to up-skilling and knowledge transfer would facilitate the development of mobile research which could be conducted according to participant preference.

Whilst taking university-led research out to the community may be one means of ensuring a greater degree of rangatiratanga on the part of Māori participants and communities, another option is for Māori themselves to control all aspects of research. Iwi-based research centres established by iwi, accountable to iwi and located within iwi boundaries are one means of ensuring the interests of a specific iwi are represented in research. Examples of iwi research do exist, such as Whakauae Research for Māori Health and Development, a research centre established by, and directly accountable to, the people of Ngāti Hauiti. Māori writers have discussed the unfair balance of power obtained in the process of colonisation, and how this is perpetuated in mainstream institutions (Smith, 1999). Locating research in Māori communities, however, could enhance the expression of rangatiratanga and give a greater sense of research ownership to the participants. In the case of the researcher, relocating research into Māori-governed land could instil a greater sense of accountability for researchers who, rather than having the "safety" of the institution behind them, become visitors in the "homes" of research participants. Relocating the "control centre" of research activity will also significantly alter the balance of power in subsequent research, the result being that researchers and communities will enter into a research partnership on a more equal footing.

The achievement of overall well-being is the ultimate goal of Māori health efforts, and one would therefore expect this goal to be reflected in the assessment of outcomes (Durie, 2004). While such a framework has been developed for Māori mental health interventions (Durie & Kingi, 1998), to our knowledge, appropriate outcome measures have not been developed which apply to physical health strategies. For example, although following an exercise routine may improve markers of physical health, an individual's whānau may suffer if the time commitment to exercise is too great. The methods and markers used to assess physical health and fitness may not reflect Māori values either. For example, weight and body mass index (BMI) have been used as markers of public and individual health in many research and clinical settings. While these markers correlate with particular illnesses, an absence of illness is not the same as the achievement of health, hauora, or mauri ora, and may not therefore correlate with concepts of health most valued by Māori.

As discussed previously, qualitative methods of research, such as questionnaires and focus groups based on Māori perspectives of health, should be part of the physiological research process when involving Māori. By incorporating qualitative measures, research will more likely translate into effective interventions that take into account the effect of such programmes on wairua, hinengaro, tinana and whānau.

To be effective in combatting the lifestyle diseases besting Māori, we would argue that health research needs to target the prevention of lifestyle illnesses rather than focusing solely on the treatment of disease. Lifestyle illnesses negatively affect one's psychological, spiritual and whānau well-being. Thus, focusing on the prevention of such illnesses, rather than waiting until treatment is required, would impact positively on all aspects of well-being. Not only is it more humane to avoid the suffering caused by lifestyle illnesses, but it is more cost-effective in regard to the financial burden placed upon

individuals, whānau and the health care system (Booth, Gordon, Carlson, & Hamilton, 2000). Therefore, although the barriers to science for Māori have been discussed, one could also argue that in recent times, the mainstream health system and the scientific research which informs health policy have actually hindered the progress of Māori well-being by focusing on treatment rather than prevention. The focus on treatment has influenced research themes as well as the allocation of funds and resources in research. While the call for a paradigm shift in health toward prevention is not new, prevention of illness aligns more closely to Māori health aspirations than "treatment of the sick" and this should be reflected in the focus and allocation of funding for Māori health research.

Finally, although we often discuss the importance of applying kaupapa in Māori research settings, these research methods could, and likely would, benefit mainstream research. During a national Māori health conference held in 1984, Hui Whakaoranga, Māori recommended that health and educational institutions recognise culture as a positive resource (Department of Health, 1984, p. 23). Harris and Mercier (2006) also comment that learning from more than one knowledge system can only increase knowledge and help people make better-informed decisions in a multi-cultural world. Indeed, our research included non-Māori participants and the same guidelines and practices were applied to these as were applied with the Māori participants. Although a qualitative assessment of our participants' experience during the research process was not conducted during the studies discussed, including such an assessment in future studies could provide valuable insight into whether this approach is suitable for Māori and non-Māori participants alike.

Conclusions

The paradox with Western science is that while it discovers treatment and technologies to better understand and conquer lifestyle illnesses, the same advances in technology are partly responsible for developing an environment which supports an unhealthy lifestyle. The purpose of this paper is not to dispute the value of scientific research, nor argue that a Māori approach to research is more effective, but to present the possibility of using both methods of research to benefit Māori and non-Māori alike. As Indigenous people, it is our right to have our views reflected in the research process and in the application of findings into intervention, especially when we are hardest hit by the research topic. Although Māori are becoming more involved in Māori-focused research, the ultimate goal in this sense should be Māori-driven research that is developed by Māori for Māori, using a combination of scientific and Māori methods. The nature of exercise science research can help with this transition.

The New Zealand health system, currently burdened by "unhealthy Māori" (Robson, 2007), would benefit greatly by investing more into improving Māori health and well-being. Arguably, investing in Māori designed and led exercise research would produce a great return on such investment. However, what is also required is a shift in focus, from treatment of illness toward maintenance of well-being (prevention). Exercise research would enable policy makers and strategy designers to better understand the specific exercise needs for Māori and other high-risk populations.

The notion of applying Māori knowledge and views to current health research, alongside a physiological approach, will benefit both Māori and scientific knowledge equally. Durie puts it simply when noting that exploring the interface of Māori views and science allows us to shift the focus from "proving the superiority of one system over another to identifying opportunities for combining both" (Durie, 2004). We argue that in the field of exercise science there is potential to bridge both reductionist and holistic views on health, as well as bridging Indigenous and Western approaches to

research. In the case study presented here, we have demonstrated how this might be achieved. By drawing on the merits of Indigenous and Western research approaches, we have offered a way forward for both the prevention and treatment of lifestyle illnesses. Drawing on the strengths of the two worldviews—Western science and mātauranga Māori—ensures research outcomes which are of value to both the Māori and the scientific communities.

Glossary

Aotearoa	a Māori name now used for New Zealand
hapū	a kinship group, clan or sub-tribe
hauora	a term used synonymously with "health" but which also encompasses wellness
hinengaro	mind, thoughts; often refers to the mental/psychological aspects of health in this context
iwi	extended kinship group, tribe
kai	food
karakia	prayers, ritual chants, incantations
kaupapa Māori	Māori approach, ideology, principles, customary practices
koha	gift, offering, contribution
mana	status, prestige, spiritual power
manaakitanga	hospitality, generosity, reciprocation
marae	an ancestral place of gathering and meeting where traditional ceremonies take place and traditional knowledge is transferred
mātauranga Māori	Māori knowledge, wisdom, understanding
mauri ora	a term representing "well-being" in this context
mihi whakatau	a formal welcoming ceremony
mihimihi	speech of greeting, tribute
pōwhiri	welcoming ceremony
rangatiratanga	right to exercise authority, ownership, and leadership; self-determination
rohe	district, region, territory
taonga	treasure, prized, valued
Te Pae Māhutonga	a contemporary model of Māori health promotion, likened to the Southern Cross constellation of stars
Te Whare Tapa Whā	a contemporary Māori health model; likens health to a four-walled house
Te Wheke	a contemporary Māori health model; likens health to the many legs of the octopus

tikanga	accepted customs, traditions, and guidelines for daily life, interactions and ceremony. Tikanga may vary between regions, tribes and families.
tinana	physical body; refers to physical aspects of health
wairua	spirit, soul; refers to spiritual aspects of health and well-being
wairuatanga	refers to principles and actions associated with spiritual aspects of a Māori worldview
whakapapa	genealogy, histories, lineage, descent
whakatau	a formal welcome
whakawhanaungatanga	a process of getting to know each other, building relationships, and establishing familial links
whānau	family, both immediate and extended
whanaungatanga	sense of family connection

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