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Exercise Improves Quality of Life in Indigenous Polynesian Peoples With Type 2 Diabetes and Visceral Obesity

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***Background*:** To evaluate the differential effect of 2, group-based exercise modalities on quality of life (QoL) in indigenous Polynesian peoples with type 2 diabetes (T2DM) and visceral obesity. ***Methods*:** Participants were randomized to resistance training or aerobic training performed 3 times per for 16 weeks. The Short-Form 36 was administered at baseline and post intervention to assess 8 domains and physical and mental component scales (PCS and MCS) of QoL. ***Results*:** With the exception of Mental Health and MCS, all scores were lower at baseline than general population norms. Significant improvements were documented in several QoL scores in each group post intervention. No group × time interactions were noted. Pooled analyses of the total cohort indicated significantly improved Physical Functioning, Role-Physical, Bodily Pain, General Health, Vitality, Role-Emotional, PCS and MCS. Adaptation ranged from 5%–22%, and demonstrated a moderate-to-large effect (Cohen's d = 0.64–1.29). All measures of QoL increased to near equivalent, or greater than general norms. ***Conclusion*:** Exercise, regardless of specific modality, can improve many aspects of QoL in this population. Robust trials are required to investigate factors mediating improvements in QoL, and create greater advocacy for exercise as a QoL intervention in this and other indigenous populations with T2DM.

***Keywords*:** SF-36, Maori, Pacific, ethnic, health

The global prevalence of type 2 diabetes mellitus (T2DM) is currently increasing from an estimated 171 million cases in 2000 to more than 366 million cases in 2030.[1] Colonized, indigenous populations are severely affected by this pandemic.[2,3] In New Zealand, the Polynesian peoples have 3 times the prevalence of T2DM versus the total population.[4] The Polynesian peoples also suffer from a higher burden of diabetes comorbidities and complications,[5–7] which has contributed to marked and expanding inequalities of life expectancy.[8]

Patients with T2DM suffer significant impairments of health-related quality of life (QoL) versus healthy individuals,[9–12] and these impairments may be exacerbated by poorer glycemic control[10] and comorbidities (eg, obesity, cardiovascular disease, hypertension, depression, dyslipidemia, etc).[11,13–17] Low QoL has also been noted in indigenous populations.[18] For example, according to a recent national health survey, New Zealanders of Polynesian descent scored lower on virtually all QoL measures versus their European counterparts.[18] The authors did not speculate on specific reasons for this disparity, however, poorer QoL in Polynesian peoples has been linked to discernible inequalities in income, education, employment, and housing,[19] as well as interpersonal and institutional racism and discrimination.[19,20]

Optimal glucoregulation, reflected by markers such as glycosylated hemoglobin (HbA1c), is important for the prevention of diabetic complications and the preservation of QoL.[9] Exercise prescription involving resistance training, aerobic training, or a combination thereof has been shown to significantly improve HbA1c and related parameters (eg, insulin sensitivity, body mass index, body adiposity) in T2DM[21–23] and the importance of exercise for diabetes management is now well-established.[24] Less emphasis, however, has been directed toward investigating the link between exercise and psychological health status in T2DM. Recent evidence has been mixed, with studies indicating that prescribed exercise may have a beneficial effect,[25] a negative effect,[25] or no effect.[26–30] Further, several studies have reported only global

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indicators of QoL, with less evidence concerning specific subdomains. Additional research is required before conclusions can be drawn regarding the effects of various methods of exercise, including the isolated effects of aerobic and resistance training, on specific domains of QoL. In addition, no trial to date has evaluated the effect of exercise on QoL outcomes in an indigenous population afflicted with T2DM. This is a notable gap in the literature given the prevalence of T2DM and the degree of impairment of QoL in these populations.

Efforts are required to mitigate the diabetes epidemic and improve QoL outcomes in New Zealanders of Polynesian descent.[31,32] We have recently shown that exercise training, involving aerobic or resistance training modalities is safe and can induce metabolic benefits in high-adhering Polynesian peoples with T2DM and visceral obesity.[33] The purpose of the current study was to determine if these exercise modalities could also improve QoL in this cohort.

Methods

Cultural Consultation and Study Design

Polynesian (Maori and Pacific Islands) cultural consultants and the Central Regional Ethics Committee of New Zealand reviewed and approved all study procedures (CEN/07/08/054; ACTRN #12609001085268). Cultural consultation revealed that potential participants considered randomization to a nonexercise control group unethical, as previously noted in a lifestyle intervention trial.[34] The study design was therefore modified from a randomized controlled trial comparing resistance training to usual care (no exercise) to a trial evaluating and comparing resistance and aerobic training.

Participants and Randomization

Participants were recruited through direct referrals by local health care professionals and evaluated for eligibility via medical screening process between February and August of 2008. Eligibility criteria included 1) self-identified Polynesian descent, 2) a clinical diagnosis of T2DM, 3) visceral obesity defined as a waist circumference ≥ 88 cm in women and ≥ 102 in men, 4) no participation in a structured exercise program for the previous 6 months, 5) no change in diabetes medications for previous 2 months, and 6) no acute or chronic medical conditions for which exercise would be contraindicated. Medical screening procedures were developed in consultation with the study endocrinologist and were in accordance with established guidelines for exercise participation.[35]

Participants were randomly assigned following baseline testing via computer-generated randomization list (www.randomization.com), stratified by gender in blocks of 4, to receive either resistance training or aerobic training for 16 weeks. Repeated measures were collected after the 16-week intervention period.

Exercise Interventions

All participants attended supervised exercise sessions 3 times per week on nonconsecutive days at a health and fitness facility (City Fitness©) located in the suburb of Porirua, New Zealand. The population of Porirua is approximately 46.5% Polynesian peoples, which is much higher than the national average (19.6%).[36] Given that lack of time is the most frequently cited barrier to exercise adoption,[37] the duration and frequency of training were equated. Groups exercised in parallel, 3 sessions per week, and the duration of each session ranged from 40–60 minutes, increasing progressively over time. Sessions were conducted in an open plan room, which facilitated socialization of participants and research staff.

The exercise regimens were developed in accordance with current guidelines published by the American College of Sports Medicine.[38] Pre- and postexercise heart rate, blood pressure, and blood glucose were monitored and recorded each session. All participants continued to receive their usual medical care and were instructed to maintain their usual dietary and physical activity habits during the trial. Adverse events and changes to physical activity patterns were monitored via weekly status checks administered in person or via telephone.

The resistance training group performed 2–3 sets of 8 major exercises using machine weights (Cybex International, Medway, MA) targeting all the major muscle groups of the body for 6–8 repetitions to neural fatigue. Exercises included seated leg press, knee extension, knee flexion, chest press, lat pulldown, overhead press, biceps curl, and triceps extension. Approximately 1 minute of rest was provided between sets and exercises, and loads were increased when participants could perform 10 repetitions with correct technique to maintain the prescribed repetition-maximum training intensity.

The aerobic training group performed exercise on a cycle ergometer (Life Fitness, Schiller Park, IL, USA). The program gradually progressed from 65% to 85% of heart rate reserve during the first 2 weeks of training, where it was maintained for the remainder of the study. Heart rate and blood pressure were monitored and recorded at peak steady state workloads. Watts and duration at peak workload were increased to accommodate improved fitness levels over time. Compliance to training was defined as the number of training sessions attempted divided by the number offered multiplied by 100%.

Quality of Life

The Medical Outcomes Trust Short Form-36 Health Survey (v. 1.0) (SF-36) was used to evaluate QoL.[39] The SF-36 has been validated in patients with T2DM[40] and in the general New Zealand population, including Maori and Pacific Islands peoples.[18] The questionnaire is comprised of 36 items and measures 8 domains of QoL, including 4 physical domains (ie, Physical Functioning, Role-Physical, Bodily Pain, and General Health) and 4 mental domains (ie, Mental Health, Role-Emotional,

Social Functioning, and Vitality). The SF-36 also provides 2 summary measures of QoL, including the Physical Component Summary (PCS) and Mental Component Summary (MCS), computed from respective domain scores. Higher domain and summary scores, ranging from 0–100, denote better perceptions of health status. The SF-36 was administered to participants in a quiet office before randomization and after the 16-week intervention period.

Statistical Analyses

Statistical analyses were performed using StatViewTM statistical software package (v. 5.0 SAS Institute, Cary, NC, USA). Data from participants who were unavailable for follow-up assessment were excluded, per protocol analysis. All data were visually inspected and statistically evaluated for normality (skewness and kurtosis between –1 and +1). Normally distributed data were described as mean ± SD. Baseline differences between groups were evaluated using an independent *t* test or Chi-square as appropriate. Time and group x time interaction effects from weeks 0–16 were analyzed by repeated measures analysis of variance. Percent change scores were computed for each participant as: [(week 16 score – week 0 score) × 100]. A *P*-value of < 0.05 was accepted as statistically significant.

Results

Participant Characteristics

A flow diagram detailing recruitment and attrition is presented in Figure 1. Fifty potential participants expressed interest in the study. Thirteen (26%) were excluded because they did not meet inclusion criteria. Of 37 eligible subjects, 11 (30%) declined to participate. Twenty-six participants were randomized and of these 18 (69%) completed the training program and follow up assessments and were included in the final analyses.

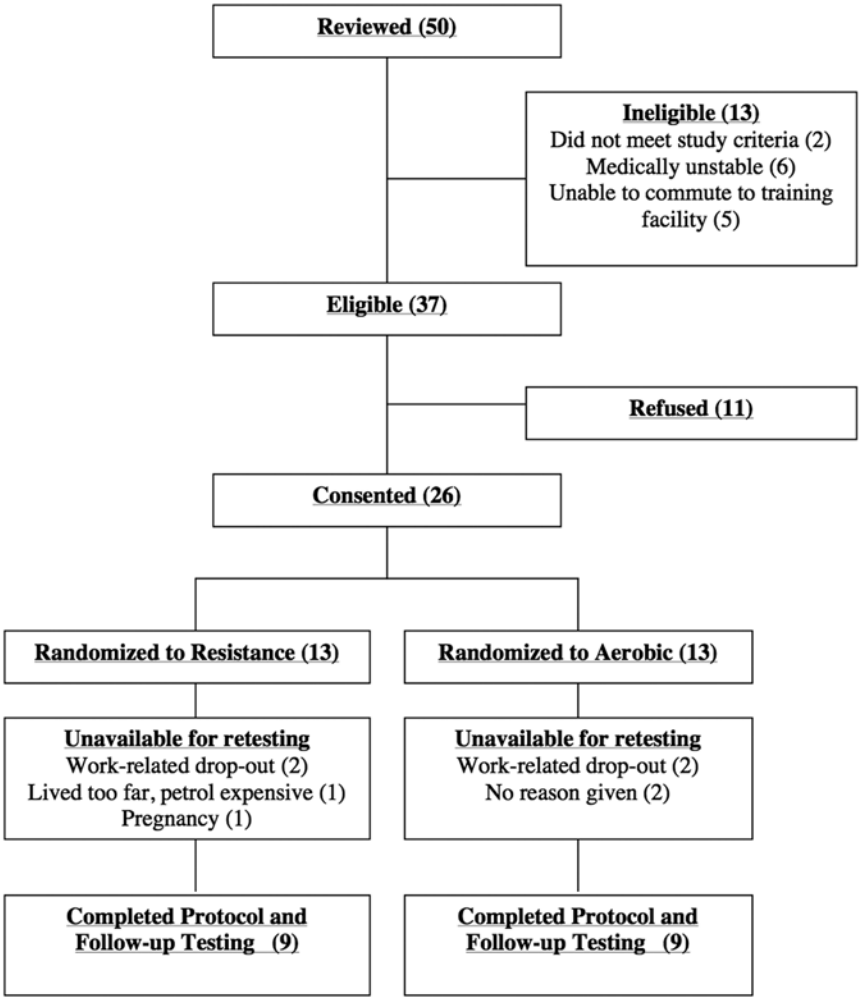

Figure 1 — Participant recruitment and flow.

Baseline characteristics for the resistance training group, aerobic training group, and total cohort are presented in Table 1. With the exception of higher systolic blood pressure in the aerobic training group ($P = .01$) and higher use of diuretics in the resistance training group ($P = .02$) no statistically significant differences noted between groups. There was a trend for higher HbA_{1c} ($P = .07$) and use of ACE inhibitors in the resistance training group ($P = .14$).

All participants met the Adult Treatment Panel III definition for Metabolic Syndrome.[41] BMI of the total cohort indicated Class III (morbid) obesity (43.8 ± 9.5 kg/m^2), while duration of known diabetes ranged from 0.5–13 years. The majority of participants were women (72%), fully employed (89%), married (83%), and had completed a minimum of high school education (96%). Age ranged from 39–59 years, which is young compared with previous studies of exercise in T2DM.[42,43] Fifty-six percent noted New Zealand Maori ancestry. Only 2 participants indicated mixed ancestry (Samoan / Cook Islands Maori / Tokelauan / European, and Fijian / New Zealand Māori).

A history of tobacco use was common (38%), and 5 participants were current smokers. Two participants had a history of myocardial infarction, while none noted prior cerebrovascular accident or cardiac surgery. Use of medications was high in the total cohort; metformin and ACE inhibitors were commonly prescribed.

Table 1 Participant Characteristics

Characteristic	Resistance	Aerobic	Total cohort
n	9	9	18
Age (years)	48 ± 6	51 ± 4	49 ± 5
Sex (women:men)	6:3	7:2	13:5
Height (cm)	166.2 ± 8.2	167.9 ± 5	167.1 ± 6.7
Weight (kg)	118.6 ± 38.5	126.8 ± 18.6	122.7 ± 29.6
Body mass index (kg/m^2)	42.7 ± 12.1	45.0 ± 6.5	43.8 ± 9.5
Waist circumference (cm)	125.4 ± 23.2	131.9 ± 13.5	128.7 ± 18.7
Systolic blood pressure (mmHg)	123.2 ± 19.4	147.3 ± 16.1*	135.3 ± 21.3
Diastolic blood pressure (mmHg)	85.7 ± 13.8	90.4 ± 5.7	88.1 ± 10.6
Self-identified ethnicity			
New Zealand Maori	6	4	10
Cook Islands Maori	1	2	3
Samoan	1	1	2
Fijian	–	1	1
Tokelauan	1	–	1
Tongan	–	1	1
Diabetes duration (years) [range]	2.6 ± 1.8 [0.5–5]	3.9 ± 4.3 [0.5–13]	3.3 ± 3.3 [0.5–13]
Glycosylated hemoglobin (HbA_{1c}) (%)	10.7 ± 2.1	8.9 ± 1.9	9.8 ± 2.1
Diabetes management regimen			
Diet only (n)	1	2	3
Oral hypoglycemics (n)	7	6	13
Oral hypoglycemics and insulin (n)	1	1	2
Blood pressure lowering medications (n)			
ACE inhibitors (n)	7	4	11
Diuretics (n)	4*	0	4
Beta blockers (n)	2	1	3
Angiotensin II receptor antagonist (n)	1	0	1
Lipid lowering medications (n)	5	3	8
Current smoker (n)	3	2	5

Note. Data expressed as mean ± SD. Baseline comparisons determined by independent sample *t* test or Chi square.

* Statistically significant difference observed between groups at baseline ($P < .05$).

Abbreviations: ACE, Angiotensin converting enzyme.

Compliance and Adverse Events

Compliance and adverse events have been reported in detail elsewhere.[33] In brief, compliance to training was 73 ± 19% and 67 ± 18% in the aerobic and resistance training groups, respectively. One male participant experienced syncope during the performance of a resistance exercise; the episode resolved upon placing him in the supine position. No other adverse events were noted as a consequence of training.

Quality of Life

Within and between group analyses are presented in Table 2. The resistance training group significantly improved 6 of 8 QoL domains from pre- to posttraining, including Physical Functioning, Role-Physical, General Health, Vitality, Social Functioning, and Role-Emotional. The improvement of Bodily Pain approached significance (P = .08) while Mental Health did not change (P = .47). Analyses of summary scales revealed a significant improvement of the *PCS* and a trend toward improved *MCS* (P = .11). The significant improvements in QoL experienced by the resistance training group ranged from +9.4% to +34.3.8%, and demonstrated a moderate-to-large effect (Cohen's d = 0.64–1.34).

Aerobic training improved 4 of 8 QoL domains from pre to post training, including Physical Functioning, Bodily Pain, General Health, and Vitality. Trends were noted toward improved Social Functioning (P = .10) and Mental Health (P = .07), while Role-Physical and Role-Emotional did not change. Similar to the resistance training group, the analyses of summary scales revealed a significant improvement of the PCS and a trend toward improvement of the MCS (P = .14). The significant improvements in QoL adaptations experienced by the aerobic training group ranged from +7.3% to +21.3%, and demonstrated a large effect (Cohen's d = 0.81–1.45).

Post Hoc Analyses

Analysis of variance between groups revealed no group × time interaction effects for domain or summary scores (Table 2). Therefore, data for the entire cohort (n = 18) were pooled to determine the effects of 16-weeks of exercise training in general. Pooled analyses revealed a significant time effect for all QoL domain scores with the exception of Mental Health (P = .09), which demonstrated a trend toward increase (Table 3). In addition, both summary scales (PCS and MCS) demonstrated a statistically significant increase from pre to post training. The significant improvements in QoL experienced by the total cohort ranged from +5% to +22%, and demonstrated a moderate to large effect (Cohen's d = 0.64–1.29). Data for the entire cohort were also separated by gender to investigate the effect of this variable on changes in QoL (data not shown). Social Functioning (P = .008), Role-Emotional (P = .004), and MCS (P = .0002) improved significantly more in men versus women. No gender differences were observed in the changes to other variables.

Discussion

This study evaluated the differential effects of aerobic and resistance training performed 3 times per week for 16 weeks on SF-36 QoL outcomes in indigenous Polynesian peoples with T2DM and visceral obesity. Participants in the resistance training group experienced statistically significant improvements in Physical Functioning, Role-Physical, General Health, Vitality, Social Functioning, Role-Emotional and PCS, while participants in the aerobic training group experienced statistically significant improvements in Physical Functioning, Bodily Pain, General Health, Vitality, and PCS. There were no group x time interactions. Pooled analysis revealed improvements in all aspects of QoL, except the Mental Health domain. The improvement of Social-Functioning, Role-Emotional and MCS were more pronounced in men than in women.

Overall, our findings suggest that exercise training, regardless of specific modality (ie, aerobic or resistance), can improve many aspects of health-related QoL in this population (Table 3). These findings are important given that low QoL is a consequence of T2DM.[9,10,12] and comorbidities,[11,13–17] and given that QoL is lower in indigenous Polynesian peoples versus their European counterparts.[18] Indeed, with the exception of Mental Health scores (domain and summary), all scores at baseline were lower than those reported for the New Zealand general population.[18] These scores were also lower than those reported for the general Maori and Pacific populations,[4] suggesting that the burden of chronic diseases in our cohort contributed to low QoL. The reason for high level of Mental Health in our cohort is not clear and requires further investigation. Other trials in patients with T2DM have reported lower scores in Mental Health.[10,12,26] Specific SF-36 norms have been established for patients with T2DM;[44] however, these norms tend to underestimate the effect of diabetes.[12] Moreover, confounding characteristics (eg, comorbidities, age, income, ethnicity) can differ markedly between diabetes cohorts making broad norms of limited use.[12]

Following the 16-week intervention period, all measures of QoL increased to near equivalent, or greater, than levels found in the general New Zealand population.[18] This finding is notable and provides a rationale for the continued investigation of exercise as a QoL intervention in this cohort. Several studies prescribing aerobic and/or resistance exercise in patients with T2DM have investigated global aspects of QoL or well-being.[25,28,29,45] To date, the findings have been equivocal with studies reporting improved QoL,[25,28,45] no effect,[25,27,29] or a negative effect.[25] Understanding these disparities requires investigation. Differences in cohorts, questionnaires, exercise prescriptions, and levels of social interaction could all potentially influence changes in QoL in exercise intervention trials.

Few trials have reported on specific subdomains of QoL in patients with T2DM.[26,30] Gram et al[30] reported no significant changes in SF-36 domain and summary scores in 68 patients randomly assigned to 4 months of

Table 2 Summary of Within and Between Group Changes in Quality of Life Domain and Summary Scores

	Resistance training (n = 9)					Aerobic training (n = 9)						
Outcome measures	Week 0	Week 16	% Change	*P*	Effect size (within group)	Week 0	Week 16	% Change	*P*	Effect size (within group)	*P* (between groups)	Effect size (between groups)
Quality of life domain												
Physical Functioning	63.3 ± 28.5	86.1 ± 23.6	22.8 ± 15.2	0.002	.92	68.8 ± 28	90 ± 10.7	21.3 ± 25.7	0.05	1.06	0.88	.08
Role-Physical	61.1 ± 30.9	88.9 ± 18.2	27.8 ± 23.2	0.007	1.16	78.1 ± 41.1	87.5 ± 35.4	9.4 ± 37.6	0.50	.26	0.24	.64
Bodily Pain	61 ± 19.4	75.6 ± 27.4	14.6 ± 22	0.08	.65	73 ± 11.8	82.5 ± 13.2	9.5 ± 8.6	0.02	.81	0.55	.32
General Health	52.7 ± 33.5	71.4 ± 28.7	18.8 ± 15.9	0.008	.64	49.4 ± 17.4	68.4 ± 9.6	19 ± 15.8	0.01	1.45	0.98	.01
Vitality	52.8 ± 22.2	78.3 ± 17.9	25.6 ± 20.8	0.006	1.34	50.6 ± 18.2	68.8 ± 12.7	18.1 ± 11	0.002	1.24	0.38	.47
Social Functioning	75 ± 15.3	91.7 ± 14	16.7 ± 14	0.007	1.21	70.3 ± 26.6	89 ± 12.4	18.8 ± 28.3	0.10	.96	0.85	.10
Role-Emotional	65.7 ± 41.8	100 ± 0	34.3 ± 41.8	0.04	1.23	87.5 ± 35.4	95.8 ± 11.8	8.3 ± 38.8	0.56	.34	0.21	.68
Mental Health	84 ± 9.6	87.6 ± 6.5	3.6 ± 14.2	0.47	.47	75.5 ± 9.9	83 ± 11.7	7.5 ± 9.9	0.07	.74	0.52	.34
Summary scores												
Physical Component	39.2 ± 14	48.6 ± 12.9	9.4 ± 5	<0.001	.74	43.1 ± 10.1	50.4 ± 6.4	7.3 ± 4.5	0.002	.92	0.38	.47
Mental Component	52.6 ± 8.5	58.3 ± 3.1	5.7 ± 9.5	0.11	.94	50.2 ± 8.1	54.6 ± 3.6	4.4 ± 7.4	0.14	.82	0.76	.16

Note. Data expressed as mean ± SD. Effect size = Cohen's *d*.

Abbreviations: PRT, Progressive Resistance Training; AER, Aerobic Exercise Training.

Table 3 Changes in Quality of Life Using Pooled Data for the Total Cohort

Outcome measures	Week 0	Week 16	% Change	*P*	Effect size
Domain scores					
Physical Functioning	65.9 ± 27.5	87.9 ± 18.2	+22%	0.0004	.99
Role-Physical	69.1 ± 35.9	88.2 ± 26.7	+19%	0.02	.64
Bodily Pain	66.7 ± 16.9	78.8 ± 21.5	+12%	0.009	.67
General Health	51.1 ± 26.4	70 ± 21.3	+19%	0.0001	.83
Vitality	51.8 ± 19.8	73.8 ± 16	+22%	<0.0001	1.29
Social Functioning	72.8 ± 20.8	90.4 ± 12.9	+18%	0.003	1.07
Role-Emotional	76 ± 39.3	98 ± 8.1	+22%	0.04	.80
Mental Health	80 ± 10.4	85.4 ± 9.3	+5%	0.09	.58
Summary scores					
Physical Component	41 ± 12.1	49.4 ± 10.1	+8%	<0.0001	.80
Mental Component	51.5 ± 8.2	56.6 ± 3.8	+5%	0.02	.83

Note. All data expressed as mean ± SD. Effect size = Cohen's *d*.

Nordic walking or aerobic plus strength training versus a usual-care control group. Similarly, Lambers et al[26] reported no significant changes in SF-36 domains in 46 patients randomized to 3 months of combined aerobic and strength training or aerobic training only versus usual care. The lack of adaptation in these studies could be attributed to the dosages of exercise prescribed. Specifically, the intensity,[26,30] frequency,[30] and duration,[26] of training were lower than prescribed in the current study. Further, the level of socialization in these trials was not mentioned,[26,30] and low interaction could have mitigated improvements in QoL, particularly the social parameters.

We acknowledge that the improvement of QoL in our cohort may have been markedly influenced by social interaction. Indeed, positive social relationships have previously been linked with various indicators of well-being.[46] Notably, in our study, Social Functioning significantly increased by 18% in the total cohort (Cohen's d = 1.07). Anecdotally, our participants expressed their satisfaction with the group-based exercise sessions, including the supportive and culturally familiar environment, and the interaction and the formation of friendships with fellow participants and exercise instructors. Socialization appears to be an inherent and important contributor to exercise participation in Polynesian people,[31] and our findings suggest that social, emotional and mental components of QoL can be particularly enhanced in Polynesian men with exercise intervention in a social environment. Hence, we did not control for social factors in our study. Trials controlling for socialization may be required to determine the isolated effects of exercise versus socialization on well-being.

The practical implications of improved physical domains in our cohort include 1) Physical Functioning: an enhanced ability to perform all types of physical activities, including those classified as vigorous, without health-related limitations; 2) Role-Physical: an enhanced ability to carry out activities of daily living without difficulty; 3) Bodily Pain: no pain or limitations due to pain; 4) General Health: an improved perception of personal health; and 5) PCS: a perceived improvement of physical status, well-being, and energy levels.[39]

Physical Functioning and General Health are particularly compromised in patients with T2DM.[12] These markers improved with large effect in the current study (Cohen's d = 0.99 and 0.83, respectively) suggesting that exercise intervention is a feasible and practical method to target physical QoL impairments in T2DM. We did not investigate changes in physical performance that could potentially mediate the change in physical components of QoL (eg, activities of daily living, muscular strength, muscular endurance, flexibility, physical performance). Such measures should be included in future trials.

The practical implications of improved mental QoL include 1) Vitality: improved feelings of vigor and energy; 2) Social Functioning: enhanced ability to perform usual social activities without interference due to physical or emotional problems; 3) Role-Emotional: no limitation in the ability to perform work or other activities of daily living due to emotional difficulties; 4) Mental Health: increased feelings of peace, calm, and happiness; and 5) MCS: improved psychological well-being and reduced limitations in work duties and activities of daily living secondary to emotional distress.

Impairments of Vitality, in particular, have been associated with the development of chronic illnesses and comorbidities, and improvement of this marker may be associated with the amerlioration of illness.[47] Additional research is required to test this hypothesis. The psychological mechanisms that could potentially meditate the increase in mental QoL were not investigated. These mediating processes may include increases in self-esteem, enjoyment of the activity, and social interaction during exercise[48] and should be quantified in future research.

The main limitation of our study was the lack of a nontreatment control group. Appropriate cultural consultation could enable the inclusion of a nonexercising control group, provided that the research objectives are

outlined a priori, and that the study design is considered of ethical standard. Cross-over and wait-list control designs may prove feasible in this regard. Additional limitations of our study included the lack of documentation of key confounding variables including diet and physical activity. An attempt to document these measures via participant-administered questionnaires proved unsuccessful due to low participant compliance. The SF-36 is a general QOL assessment instrument and no specialized QOL questionnaires have been specifically designed for use in the Polynesian population. Until the development of such an instrument, SF-36 represents the most robust and validated QOL tool available.[39] Moreover, because SF-36 is a general QOL instrument, the administration of diabetes-specific[40] and obesity-specific[49] QoL questionnaires, or a combination thereof, in future investigations may provide additional disease-specific information regarding QoL improvements in this cohort.

In summary, this study demonstrates that both aerobic and resistance training can significantly improve many components of QoL in indigenous Polynesian peoples with T2DM. There were no differences detected between these interventions. Relatively few studies have been conducted on the impact of exercise on specific QoL domains in people with T2DM and, up to this study, none in diabetic Polynesian cohort. Future research involving robust randomized controlled trials with disease-specific questionnaires may be required to create greater advocacy for exercise as a QoL intervention in this and other high-risk indigenous populations disproportionately affected by the diabetes pandemic.

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