



Exploring physical and psychological wellbeing among adults with Type 2 diabetes in New Zealand: identifying a need to improve the experiences of Pacific peoples

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Abstract

Aims This study explores levels of physical and psychological wellbeing among adults with Type 2 diabetes, and aims to identify the clinical, demographic, and psychological factors that are associated with differences in wellbeing.

Methods Research participants (N=615) were randomly selected from a database of primary care records for people with diabetes (N=4857) in New Zealand. Self-report data were collected through a mailed questionnaire and clinical data from electronic records were obtained with participants' permission.

Result Mean HbA_{1c} was 7.5% (SD=1.5) although this varied significantly across ethnic groups ($p=.001$) with metabolic control highest among New Zealand Europeans and lowest among Pacific peoples. Results showed that Pacific groups also experienced the highest levels of distress about diabetes, and concern about prescribed medication.

Conclusions Adults with Type 2 diabetes who are young, overweight, have concerns about prescribed medications, and those of Pacific ethnicity, are most likely to experience adverse health outcomes including poor metabolic control and diabetes-related distress. Among Pacific peoples in particular there is a need to address concerns about medication and emotional distress about diabetes, while maintaining a focus on improving metabolic control.

The aims of diabetes treatment are to promote good glycaemic control, and quality of life.^{1,2} Research shows that while an HbA_{1c} <7% is recommended,^{3,4} many, perhaps even the majority⁵ of people with Type 2 diabetes do not achieve this goal. However there is considerable variation between individuals. Previous research has shown that differences in health outcomes among people with Type 2 diabetes are related to clinical and demographic characteristics including ethnicity.⁶⁻⁸

Research shows that many people experience diabetes-related distress.⁹⁻¹² However there have been very few studies to date exploring individual variation in diabetes-related psychological outcomes. As a consequence we know little about how diabetes distress might vary between individuals. For example, although we know that differences between ethnic groups have been shown for metabolic control, we do not know if the psychological burden of diabetes shows a similar pattern of association with ethnicity. Health services providing psychological support for people with long-term conditions including diabetes are now funded in some regions in New Zealand and so it is very timely that research now identifies the predictors of poor illness-related *psychological* outcomes so that we may learn who is most at risk, and how best to intervene, in order to promote wellbeing among people with diabetes.

In addition to clinical and demographic characteristics, psychological variables are also related to health outcomes. For example the widely-used Common Sense Model of illness self-regulation¹³ suggests that psychological variables including beliefs about treatment can play a salient role in determining coping behaviour and subsequent health outcomes.¹⁴ Further, because treatment beliefs are amenable to change in a way that age and ethnicity for example are not, these psychological variables are of particular interest to researchers who may want to identify targets for interventions that aim to improve health outcomes.

Helping people with diabetes to stay well is clearly an important, and challenging, goal. The evidence suggests many people with diabetes experience suboptimal physical and psychological health outcomes but few studies have examined how outcomes – particularly illness-related psychological outcomes—vary across individuals. The aims of this study are to:

1. Explore levels of physical and psychological wellbeing among adults with Type 2 diabetes
2. Identify clinical, demographic, and psychological factors associated with differences in wellbeing
3. Test for between-group differences in physical and psychological wellbeing and treatment beliefs, across ethnicity.

Research design and methods

The research sample (N=1015) was randomly selected from a database of primary care records for people with diabetes (N=4857) held in Wellington, New Zealand. This database showed an under representation of Māori and Pacific groups compared with population-based diabetes estimates.¹⁵ Therefore, Māori and Pacific groups were purposefully over-sampled in the research design so that the ethnicity of participants in this study might closely reflect the demographic profile reported by the Ministry of Health¹⁵ for people with Type 2 diabetes in New Zealand. Inclusion criteria for this study were: diagnosis of Type 2 diabetes by a physician in accordance with national guidelines⁴; and aged ≥ 18 .

Psychological data were collected using a mailed questionnaire survey, with a response rate of 62% providing 629 completed questionnaires. Potential participants were mailed a letter of introduction informing them of the study and inviting their participation; two weeks later they received an information sheet, a consent form, and a copy of the research questionnaire. For consenting participants' (N=615, 98%) relevant physician-assessed clinical data including glycosylated haemoglobin (HbA_{1c}) were obtained from electronic medical records and released to the researcher in non-identifiable form. Clinical data and questionnaire data were linked by unique identifier codes; patient anonymity was protected at all times during the research. Ethical approval for this study was obtained from the Massey University Human Ethics Committee, protocol 02/140.

Participants—Table 1 provides a summary of participants' demographic and clinical characteristics. Participants' mean age was 63 years ($SD=11.6$), and forty-seven percent were female. The ethnic composition of participants (57% New Zealand European, 30% Māori, 6.4% Pacific Island) matched closely with proportional

representation of the three main ethnic groups that comprise the New Zealand diabetes population as reported by the New Zealand Ministry of Health.¹⁵ On average, length of diagnosis with diabetes was 8.1 years (*SD*=5.8); mean HbA_{1c} was 7.5% (*SD*=1.5), with a range from 4.5 to 13.5. Nine percent of participants were currently using insulin, almost half (49%) had a treatment regimen that included ACE inhibitors, and 25% had been prescribed statins. Mean body mass index (BMI) was 31 (*SD*=7.1), and 15% were current smokers.

Table 1. Demographic and clinical characteristics of participants (N=615)

Age in years (mean, sd)	63 (11.6)
Gender	
Female (number, %)	292 (47.5)
Male (number, %)	323 (52.5)
Ethnicity	
NZ European (number, %)	352 (57.2)
Māori (number, %)	188 (30.5)
Pacific† (number, %)	39 (6.5)
Other‡ (number, %)	36 (5.8)
Length of diagnosis in years (mean, sd)	8.1 (5.8)
Body Mass Index (mean, sd)	31.9 (7.1)
Haemoglobin A _{1c} (number, %)	
<7%	259 (42.1)
7–8%	196 (31.8)
8.1–9%	80 (13.0)
>9%	80 (13.0)
Current diabetes treatments (number, %)	
Diet and exercise alone	186 (30.2)
Oral treatment: ACE inhibitors	302 (49.1)
Oral treatment: Antihypertensives	221 (36.0)
Oral treatment: Statins	151 (25.0)
Insulin	56 (9.1)

† E.g., Tongan, Samoan, Cook Islands, Fijian, Niuean

‡ E.g., Dutch, German, Indian, Chinese

Measures—Length of diabetes diagnosis, current treatments, BMI, and most recently recorded HbA_{1c} were extracted from electronic medical records. General self-reported mental health and physical health were assessed using the SF-12 MCS subscale, and SF-12 PCS subscale, respectively.¹⁶ Diabetes-related psychological distress was measured using the Problem Areas In Diabetes (PAID) scale.¹⁷ The Beliefs about Medications Questionnaire (BMQ)¹⁸ was used to assess concern about diabetes medicines (six items), and perceived medication necessity (five items), with responses provided on a 5-point Likert scale: (1) strongly disagree; (2) disagree; (3) uncertain;

(4) agree; (5) strongly agree. The average score across items in each BMQ subscale were calculated providing two summary scores (medication concern; medication necessity) with a range from 1 to 5.

Statistical analyses—Mean scores were first calculated for the four primary outcome variables of interest in this study: HbA_{1c}, diabetes-related distress (PAID), self-reported general physical health (SF-12 PCS), and self-reported general mental health (SF-12 MCS), and their relationships with clinical, demographic, and psychological variables were assessed using Pearson's correlation coefficients. Second, ANCOVAs were used to test for between-groups differences in outcome variables across ethnicity. In all ANCOVA tests age, length of diagnosis, BMI, and treatment (insulin use) were entered as co-variates in the model to control for their effects. SPSS/PC version 15.0 was used for all statistical analyses with alpha set at .05.

Results

Levels of physical and psychological wellbeing—Mean HbA_{1c} was 7.5 (SD=1.5) and, as shown in Table 1, 257 participants (42.1%) met the recommended goal for Type 2 diabetes in New Zealand⁴ of an HbA_{1c} less than 7%. The average score on the Problem Areas In Diabetes (PAID) scale was 19.6 (SD=19.1) and this is in line with average scores reported in previous research.¹² Mean scores on the SF-12 PCS (physical health) and SF-12 MCS (mental health) subscales were 44.0 (SD=10.0), and 50.5 (SD=9.3), respectively.

Relationships between clinical and demographic characteristics and health outcomes—Table 2 shows the relationships between demographic and clinical characteristics and the four outcome variables of primary interest in this study (HbA_{1c}, diabetes-related psychological distress, self-reported general physical health, and self-reported general mental health). Greater age was associated with lower self-reported physical health, and higher self-reported mental health, as is consistent with previous research.¹⁶ Higher age was also related to lower HbA_{1c}, and fewer worries about diabetes. Longer length of diagnosis was associated with higher HbA_{1c}, and lower self-reported general physical wellbeing; length of diagnosis was unrelated to measures of general (SF-12 MCS) or diabetes-specific (PAID) emotional wellbeing. There was a positive relationship between prescribed insulin treatment, and HbA_{1c}.

Relationships between treatment beliefs and health outcomes—Greater concern about diabetes medication was associated with higher HbA_{1c}, higher scores on the PAID, and lower scores on the SF-12 MCS subscale as shown in Table 2. Perceived need for diabetes medication did not show significant relationships with any of the four outcome measures.

Table 2. Pearson’s correlations between health outcomes and clinical, demographic, and psychological variables (N=615)

Variables	Physical and psychological wellbeing			
	HbA _{1c}	PAID	SF-12 PCS	SF-12 MCS
Demographic and clinical variables				
Age	-.25 (<i>p</i> =.001)	-.36 (<i>p</i> =.001)	-.26 (<i>p</i> =.001)	.22 (<i>p</i> =.001)
Gender (% female, number)	-.01 (<i>p</i> =.587)	-.04 (<i>p</i> =.332)	-.12 (<i>p</i> =.007)	.02 (<i>p</i> =.680)
BMI	.15 (<i>p</i> =.001)	.17 (<i>p</i> =.001)	-.12 (<i>p</i> =.005)	-.13 (<i>p</i> =.004)
Length of diabetes diagnosis (years)	.19 (<i>p</i> =.001)	-.07 (<i>p</i> =.127)	-.12 (<i>p</i> =.007)	-.07 (<i>p</i> =.133)
Treatment (using insulin)	.13 (<i>p</i> =.001)	.07 (<i>p</i> =.090)	.01 (<i>p</i> =.988)	-.07 (<i>p</i> =.110)
Treatment beliefs				
Medication necessity	.06 (<i>p</i> =.211)	.02 (<i>p</i> =.686)	-.06 (<i>p</i> =.232)	-.08 (<i>p</i> =.108)
Medication concern	.25 (<i>p</i> =.001)	.57 (<i>p</i> =.001)	.02 (<i>p</i> =.739)	-.34 (<i>p</i> =.001)

Differences in diabetes-related outcomes by ethnicity—Figure 1 displays means for HbA_{1c} across four ethnic group categories: New Zealand European; Māori; Pacific; and Other. Figure 2 shows average scores on the Problem Areas in Diabetes scale across these same four ethnic groups. On average HbA_{1c} was lowest (showing better metabolic control) among New Zealand European participants, and highest among Pacific participants. Pacific participants also showed the highest scores on the PAID, as displayed in Figure 2.

Figure 1. Glycaemic control by ethnicity showing means and 95% confidence intervals

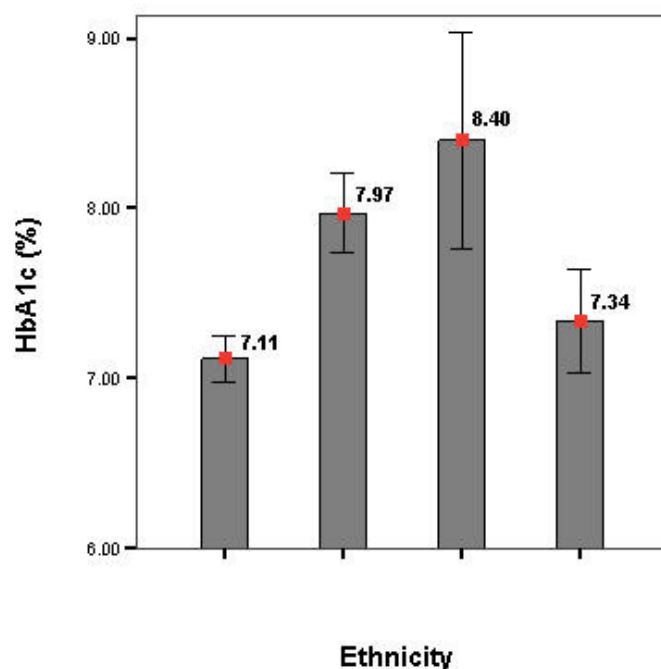
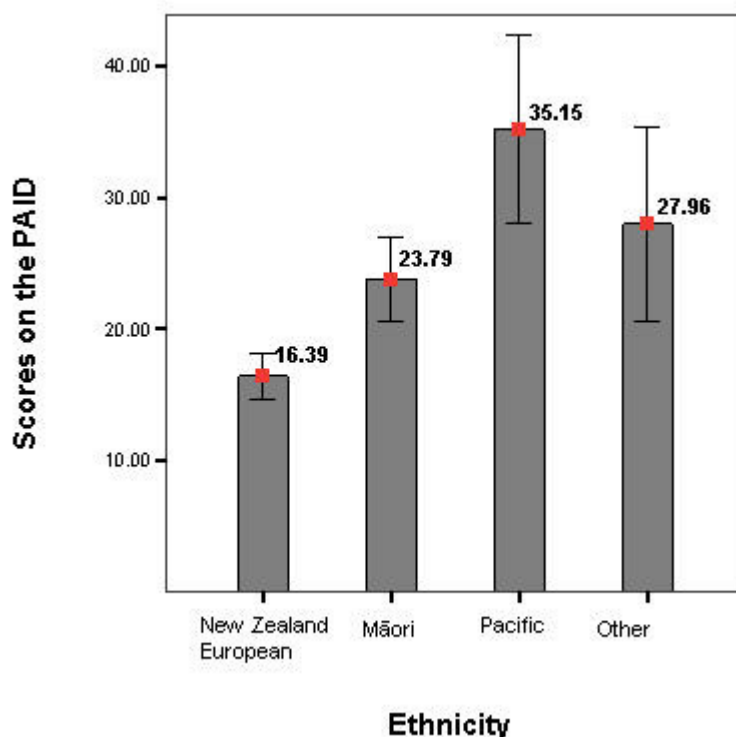


Figure 2. Scores on the Problem Areas in Diabetes (PAID) scale by ethnicity showing means and 95% confidence intervals



Testing between-group differences—Table 3 displays means (SE), and p-values from ANCOVAs testing for between-group differences in physical wellbeing, psychological wellbeing, and medication beliefs across four ethnic groups. Analyses controlling for the effects of age, length of diagnosis, BMI, and insulin use showed that there were significant between-group differences for: HbA_{1c} ($p=.001$); scores on the PAID ($p=.001$); SF-12 MCS ($p=.030$); and the medication concern subscale of the BMQ ($p=.001$). Results show that, on average, Pacific peoples showed the highest HbA_{1c}, and reported the greatest worry about diabetes; and they also showed the highest levels of concern about prescribed medication. An additional ANCOVA controlling for scores on the SF-12 MCS was run for the PAID and this did not change the reported results. This suggests that the higher levels of diabetes-related distress found among Pacific people were not accounted for by any cultural differences in self-reported general mental health.

Table 3. Means, standard errors, and p-values showing between-groups differences[†] in physical wellbeing, psychological wellbeing, and treatment beliefs across four ethnic groups

	Ethnicity				p-value
	New Zealand European (n = 352)	Māori (n = 188)	Pacific (n = 39)	Other (n = 36)	
	M (SE)	M (SE)	M (SE)	M (SE)	
Physical wellbeing					
Haemoglobin A _{1c}	7.11 (.08)	7.97 (.11)	8.40 (.22)	7.34 (.24)	0.001
SF-12 PCS	43.24 (.56)	45.14 (.78)	44.89 (1.61)	44.23 (1.69)	0.246
Psychological wellbeing					
PAID	16.39 (1.03)	23.79 (1.45)	35.15 (2.99)	27.96 (3.14)	0.001
SF-12 MCS	51.36 (.52)	48.94 (.73)	51.37 (1.50)	48.70 (1.6)	0.030
Treatment beliefs					
Medication concern	2.23 (.05)	2.33 (.07)	3.04 (.13)	2.81 (.14)	0.001
Medication necessity	3.94 (.05)	3.97 (.06)	3.82 (.13)	3.72 (.14)	0.357

[†] Adjusted for age, length of diagnosis, BMI, and insulin use

Comparison of respondents and non-respondents—T-tests and χ^2 tests examining potential differences between respondents and non-respondents showed no significant difference in gender, or length of diabetes diagnosis, but there was a difference between respondents and non-respondents for HbA_{1c}, $F(1,1015) = 13.67, p < .001$, and ethnicity, $\chi^2(3, N = 1275) = 59.83, p < .001$. On average, non-respondents had a higher HbA_{1c} ($M = 7.79, SD = 1.67$) than respondents ($M = 7.45, SD = 1.52$), and those who returned a completed questionnaire were more likely to be of New Zealand European ethnicity.

Discussion

On average, people with Type 2 diabetes in New Zealand appear to show similar levels of self-reported general physical health to peers with diabetes in other countries,¹⁶ and similar levels of general emotional functioning to same-age peers without diabetes.^{16,19} In this study the majority (58%) of participants did not meet the recommended goal⁴ of an HbA_{1c} < 7%. These results are congruent with international research⁵ and show that many people with Type 2 diabetes experience difficulty achieving good metabolic control. However physical and psychological health outcomes do vary across individuals and this variation was found to be associated with clinical, demographic, and psychological factors.

Clinical and demographic factors associated with differences in wellbeing among adults with Type 2 diabetes—Higher BMI, younger age, greater length of diagnosis, and insulin use were associated with higher HbA_{1c}, and this is in keeping with observations that: being overweight exacerbates difficulties with blood glucose regulation; insulin resistance increases over time among people with Type 2 diabetes; and poor metabolic control leads over time to more intensive treatment, including the prescription of insulin.

Results are consistent with research showing that age has a protective effect on general psychological wellbeing,¹⁶ and suggest that this effect may also extend to diabetes-related worries.¹⁰ Older adults may have had more exposure to health problems (as the risk of common chronic illnesses such as coronary heart disease increases with age), and as a result could have developed greater skills for coping successfully with the emotional impact of illness, in comparison with younger adults.¹¹ Interestingly—and in contrast with some previous research¹⁰—insulin use was not associated with higher diabetes-related distress.

Relationships between treatment beliefs and physical and psychological wellbeing—Our findings show that people who are more concerned about using prescribed diabetes medication (e.g. worried about harmful side-effects, or possible dependency) are more likely to experience poor metabolic control and higher diabetes-related distress than those who have less concerns about pharmacological treatments. It is possible that this relationship between medication concern and health outcomes is mediated by medication use: this is in line with research showing that greater concern about prescribed medication is associated with lower adherence to the prescribed treatment regimen in other chronic conditions.²⁰ Perceived need for diabetes medication was not related to differences in any of the four primary outcome variables: this contrasts with results reported by Barnes et al.⁷ but is consistent with

the absence of a relationship between medication necessity and self-reported adherence among renal haemodialysis patients.²⁰

Differences in diabetes-related health outcomes across ethnicity—In comparison with New Zealand European participants in our study, on average, Māori and Pacific peoples experienced lower glycaemic control. Our findings are in line with research from New Zealand^{7,8} and internationally^{6,21,22} showing that physical health among people with diabetes varies by ethnicity and that indigenous peoples and recent immigrants are often worst off. There are many possible reasons for this and they include: delays in diagnosis²³ and treatment;^{8,24} differences in lifestyle behaviours,²⁴ rates of obesity,^{8,25} and diabetes education;²⁶ and genetics.²⁷

Findings extend our understandings of the way diabetes-related health outcomes vary by showing that *psychological* outcomes such as diabetes distress show a similar pattern of differences across ethnicity to that previously reported for physical health. In our study the observed pattern was very consistent across both diabetes-related physical and psychological wellbeing, with highest metabolic control and lowest diabetes-related distress among New Zealand Europeans, and the reverse (lowest metabolic control and highest diabetes-related distress) reported among Pacific peoples as Figure 1 and Figure 2 illustrate. Our findings are interesting partly because previous international research has not shown a relationship between ethnicity and diabetes-related distress.¹⁰

While it is useful to better understand how health outcomes—including illness-related psychological outcomes—vary by ethnicity, we emphasise the need to consider how this information can be used to improve population health outcomes. For example: to identify who is most at risk for adverse outcomes; consider how best to intervene; and to provide added impetus for the development of interventions that are acceptable, effective, and culturally appropriate for the New Zealand diabetes population.

Identifying who is most at risk for adverse outcomes—Among adults with Type 2 diabetes in New Zealand overweight individuals; those on insulin; younger adults; and those who have had diabetes for a longer time, are most at risk for adverse physical health outcomes including poor glycaemic control. Younger adults, and those who are overweight, also appear to be most at risk for experiencing diabetes-related psychological distress. Two further characteristics identified as important in showing who is most at risk for adverse health outcomes are: high concerns about diabetes medication, and Pacific ethnicity.

Clinical implications and opportunities for intervention—Patients who have high concerns about diabetes medications could be identified using a brief screening tool (for example, the 6-item medication concern subscale from the BMQ) and invited to talk in detail about their concerns. This gives clinicians an opportunity to clarify any misperceptions (e.g. regarding potential harms), provide reassurance, and explain the benefits of the prescribed treatments. As previous research has shown that lower medication concern is associated with higher self-reported medication adherence^{20,28} any success in reducing concern about diabetes medication may benefit psychological wellbeing but could also help to increase medication adherence and therefore metabolic control.

Younger adults and those who are overweight appear to be at greater risk of both diabetes-related psychological distress and poor metabolic control and this suggests another possible target group for clinical intervention. For example, practice records could be used to identify young overweight patients with diabetes and extra support could be provided to help these patients manage the emotional consequences of diabetes and improve self-care behaviour, particularly as Type 2 diabetes in young people is associated with the early onset of significant complications such as nephropathy.²⁹ Interventions that are engaging to younger adults—for example those that are text or internet-based—may be most useful.

One important clinical implication of our findings is the need to better assist Māori and Pacific people in managing diabetes. Primary prevention programmes that seek to prevent the unnecessary excess burden of morbidity through *early* intervention, include wider family networks, and seek to improve both metabolic control and diabetes-related psychological wellbeing (particularly given the importance placed on physical *and* psychological wellbeing—te taha tinana, and te taha hinengaro—in Māori health frameworks³⁰), are strongly encouraged. Evidence suggests that Pacific people with diabetes may be less intensively treated than New Zealand Europeans, for example they are less likely to be prescribed statins,⁸ and this may also contribute to poor health outcomes and should be addressed in primary care practice.

We are not aware of any other New Zealand research assessing cultural differences in diabetes-related psychological wellbeing and this is an important original contribution of the present study. Findings show that among Pacific people in particular, there is a pressing need to reduce concerns about diabetes medication and emotional distress about diabetes while continuing to focus on improving glycaemic control. Diabetes nurse educators, diabetes specialist nurses, and health psychologists could play an important role in delivering this type of care in collaboration with primary care and specialist physicians. The recent development of clinics that provide psychological support for people with an ongoing physical illness including diabetes is very timely, and we encourage staff at these clinics to carefully consider the needs of Pacific peoples with diabetes.

Limitations and directions for future research—The cross-sectional design of the current study precludes the interpretation of causal relationships and some caution in the generalisability of results is suggested as there were small numbers of participants in some subgroups (e.g., Pacific peoples). The response rate is modest (62%) and could be improved in future research. Two identifiable strengths of this study are the inclusion of both clinical and psychological data; and the close match between the cultural composition of the research sample and the population of interest (people with Type 2 diabetes in New Zealand).

There are reasons to interpret the results of this study with some caution. First, many people may identify with more than one ethnic group. However in the primary care database used to identify potential participants ethnicity was recorded as a single variable with mutually exclusive categories (e.g., New Zealand European; Māori; Pacific; or Other). Second, differential non-response was associated with ethnicity in this study and may represent a potential compromise to the external validity of the study. The use of an English-language questionnaire may have reduced the response rate among those for whom English is a second language. Further the absolute number

of Pacific Island participants in this study (n = 39) is small. We recommend that further research is undertaken to test the validity of our findings and to determine whether the results that we report are representative of the broader experiences of Pacific peoples with Type 2 diabetes in New Zealand.

Findings from the present study may be useful to guide the direction of future research. Results highlight the poor health outcomes experienced by Pacific people with diabetes; however further research is needed to help us understand how these come about. For example, we need to examine the causal relationships between HbA_{1c} and diabetes-related distress. Poor metabolic control (with the associated increase in complications) may cause an increase in diabetes-related distress; alternatively, high distress and concern about medication could reduce medication adherence, and thus lead to lower metabolic control. Prospective cohort studies will help to disentangle the direction of causality. Future research could also examine variation in health outcomes between Pacific subgroups (e.g. Samoan, Tongan, and Fijian) as this has been shown to be important in studies of cardiovascular disease risk³¹ but was not feasible in our study due to small group sizes.

Competing interests: The author has no competing interests to declare.

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Acknowledgements: I am very grateful to the participants and thank them for their time in assisting with this research. The following organisations are acknowledged for their support: Wellington Regional Diabetes Trust; Palmerston North Medical Research Foundation; New Zealand Society for the Study of Diabetes; and the Economic and Social Research Council (UK). Particular thanks are expressed to Dr Fiona Alpass and Dr Christine Stephens (Massey University, New Zealand) for their excellent supervision and professional guidance; and to Rebekah Tuileto'a, Fiasili Vaeau, and Mandy Faimalie for their support.

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