IMPACT OF DIABETES ON QUALITY OF LIFE FOR PERSONS LIVING IN THE

BELLA COOLA VALLEY

by

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Abstract

Certainly, there is evidence that diabetes affects the physical and emotional well-being of people who have it. The present study investigated the effect that diabetes has on self-rated health, satisfaction with various specific domains of life, and satisfaction with quality of life operationalized as happiness, satisfaction with life as a whole, and satisfaction with overall quality of life. Nine hundred and sixty-eight people living in British Columbia's Bella Coola Valley completed a survey that included one-item measures of these characteristics. It was found that, compared to people without diabetes, people with diabetes—regardless of the extent of their associated comorbidities—were no more likely to be unhappy or dissatisfied with their lives as a whole or with the overall quality of their lives. However, people with diabetes rated their current health significantly worse.

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- 1 Location of the Bella Coola Valley
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CHAPTER I

1

Introduction

Diabetes has been described as a "burgeoning worldwide epidemic." The most recent available Canadian data indicate that in 1998/1999, the physician-diagnosed prevalence of diabetes in people who were 20 years of age and older was approximately 1.05 million. This number translates to 4.8% of the total Canadian population. Yet, previous estimates suggest that the true proportion may actually be greater than 7% (Canadian Diabetes Association [CDA], 2003, p. S1). In any case, these statistics are alarming: Not only are they associated with huge financial costs to the Canadian healthcare system, but they are also an indication of the tremendous potential that exists for deterioration in Canadians' quality of life. Following a review of recently reported financial costs associated with diabetes in Canada is an overview of what lies ahead in the lives of people who develop it.

Financial Burden of Diabetes in Canada

"The World Health Organization (WHO) estimates that four to five percent of health budgets are spent on diabetes-related illnesses. In Canada, it is estimated that at least \$9 billion is spent annually on treating people with diabetes and its complications" (CDA, 2000). Yet, in light of current demographic trends that are expected to contribute to an ever-increasing prevalence of diabetes in Canada—for example, an aging total population, growth in the Aboriginal population, and an increasing prevalence in obesity—the true extent of financial burden may not yet be realized. Meanwhile, "healthcare budgets are at the top of the Canadian political agenda," and there is increasing recognition of the need to "ration and appropriately allocate healthcare resources" (CDA, 2003, p. S1), preferably using evidence-based guidelines.

Partly in response to the above pressures, the CDA recently released the "2003 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada." However, in order to encourage people with diabetes to embrace the recommendations contained within these guidelines, there will be a need to consider how they view their disease and its impacts—both current and anticipated—on their lives. These impacts cannot be fully appreciated without an understanding of how diabetes manifests itself, and what the current treatment recommendations involve. Both of these topics are discussed below.

Clinical Manifestations of Diabetes

Broadly speaking, diabetes mellitus is a term that is used to refer to "a heterogeneous group of diseases of the endocrine system" (Zeman, 1991, p. 399). These diseases include type 1 diabetes, type 2 diabetes, gestational diabetes mellitus, and a category of "other specific types" that are relatively uncommon (CDA, 2003, p. S7). Each one is characterized by hyperglycemia resulting from defective insulin secretion, insulin action, or both.

Over time, hyperglycemia is associated with a number of macro- and micro-vascular and neuropathic complications that can have quite devastating effects. For instance, macro-vascular disease, which damages the large blood vessels, is associated with coronary artery, cerebro-vascular, and peripheral vascular disease (Beaser, Garbus, & Jacobson, 1996). Peripheral vascular disease can cause blood vessel occlusions in the legs and feet (Zeman, 1991). At best, these occlusions may result in feelings of pain,

coldness, and fatigue in the affected area or areas. However, if they become severe, wounds and infections are no longer able to heal properly, ulcers and gangrene develop easily, and vascular bypass or amputation are frequently the only alternatives. Meanwhile, micro-vascular disease damages smaller blood vessels, particularly in the eyes and kidneys (Beaser et al., 1996; Zeman, 1991). Once again, this damage can have dire consequences. For instance, retinopathy may be accompanied by blurred or double vision, halos, and pain in the eyes (Zeman, 1991). It can even lead to blindness (Beaser et al., 1996; Zeman, 1991). Similarly, kidney disease often leads to kidney failure, thus leaving the affected person's survival dependent on dialysis or kidney transplantation (Beaser et al., 1996).

Nerve damage due to diabetes may occur in either sensory or motor nerves, or both (Beaser et al., 1996). Sensory neuropathies are not only uncomfortable, but they can also eventually lead to sensory loss, in effect leaving legs and feet more susceptible to becoming wounded or infected. Motor neuropathies resulting in muscle wasting can also be very debilitating, as can neuropathies of the autonomic nervous system. For instance, the latter can lead to a wide range of clinical manifestations, including orthostatic hypotension, male impotence or retrograde ejaculation, cardiac arrhythmias, digestive problems, or dysfunctional sweating.

To date, "randomized, controlled trials have provided compelling evidence that longterm complications of diabetes mellitus can be reduced by tight glycemic control" (CDA, 2003, p. S18). Thus, the current CDA Clinical Practice Guidelines recommend that therapy for most people with type 1 or type 2 diabetes be targeted to achieve a hemoglobin A_{1c} (Hb A_{1c}) value that is less than or equal to 7.0%. To achieve this goal,

these people are encouraged to aim for fasting or pre-prandial plasma glucose levels of 4.0 to 7.0 mmol/L and 2-hour post-prandial plasma glucose levels of 5.0 to 10.0 mmol/L.

Certainly, for the purpose of gaining insight into the life of someone who has diabetes, the numbers stated above are not as meaningful as the effort that is required to achieve them. Indeed, "successful diabetes care depends on the daily commitment of the person with diabetes mellitus to self-management through the balance of lifestyle and medication" (CDA, 2003, p. S14). The following paragraphs briefly describe the nature of these lifestyle and medication commitments. However, they—as well as the remainder of this paper—will focus on type 2 diabetes, since it accounts for the vast majority of all diabetes cases (p. S1).

Management of Hyperglycemia in Type 2 Diabetes

Upon being diagnosed with type 2 diabetes, it is recommended that each person receive lifestyle counseling from one or more members of a diabetes healthcare team (CDA, 2003). A major focus of this counseling is on proper nutrition, which is ideally discussed with a registered dietitian. The main goals of nutrition therapy for people with diabetes are to help them to: (a) meet their nutritional needs by following "Canada's Guidelines for Healthy Eating"; (b) choose low-glycemic-index foods in place of high-glycemic-index foods that are within the same category; (c) substitute sucrose and sucrose-containing foods for other carbohydrates as part of mixed meals, up to a maximum of 10% of energy, and only if they are maintaining adequate blood glucose and lipid control; (d) restrict combined saturated fats and trans fatty acids to less than 10% of energy; (e) choose monounsaturated fats, when possible, and include foods rich in polyunsaturated omega-3 fatty acids and plant oils; and (f) match insulin to

carbohydrate content, if they are on intensive insulin treatment regimens. As well, at least one person on the diabetes healthcare team should ensure that each person is informed about alcohol use and the significant benefits of regular physical activity.

If, after two to three months, lifestyle management alone is not enough for a person with type 2 diabetes to achieve the recommended glycemic targets, then an antihyperglycemic agent should be introduced (CDA, 2003). For people whose HbA_{1c} levels are 9.0% or higher upon their initial diagnoses of diabetes, an antihyperglycemic agent should be introduced concomitant with lifestyle counseling. Then, if glycemic targets are still not achieved, one or more additional antihyperglycemic agents should be added. Insulin therapy is the last recourse for people who are unable to achieve glycemic targets using lifestyle management and one or more antihyperglycemic agents. However, for people whose HbA_{1c} levels are 9.0% or higher upon their initial diagnoses of diabetes, and their initial diagnoses of diabetes, and the people whose HbA_{1c} levels are 9.0% or higher upon their initial diagnoses of diabetes, and the people whose HbA_{1c} levels are 9.0% or higher upon their initial diagnoses of diabetes, insulin may be introduced concomitant with lifestyle counseling.

Thus far, the present discussion has reviewed the clinical manifestations and treatment regimens that can be imposed on the lives of people with type 2 diabetes. Next, it will turn to a review of research that has investigated their subjective life quality. First, however, it is useful to consider the following observation that was made by Rubin (2000):

...almost every person with diabetes I have ever met feels that diabetes powerfully affects their lives, and most feel burdened by the manifold demands of their disease. I call this experience "diabetes overwhelmus," since so many people feel overwhelmed by the continuous burden of their disease and its management. (p. 1)

Subjective Life Quality Among People With Diabetes

It is evident that optimizing the abilities of people with diabetes to manage their symptoms and to avoid developing complications are primary objectives of diabetes

care. So too, however, is enabling them to achieve a worthwhile quality of life (Beaser et al., 1996). Nevertheless, Rubin's (2000) observation noted above would imply that this latter objective is perhaps not often realized. Indeed, this possibility has inspired a wide variety of research. The following paragraphs describe several studies that are typical of those that were identified in a review of the literature on the broad topic of quality of life among people with type 2 diabetes.

<u>Previous studies.</u> Jacobson, deGroot, and Samson (1994) investigated the healthrelated quality of the lives of 240 people who were 18 years of age and older, and who had previously been diagnosed with either type 1 or type 2 diabetes. Their primary objective was to compare the usefulness of two instruments that are often relied upon for such investigations: the Diabetes Quality of Life (DQOL) Measure (DCCT Research Group, 1988) and the Medical Outcomes Study 36-Item Short Form Health Survey (SF-36) (Ware & Sherbourne, 1992). These are diabetes-specific and generic health-related quality of life (HRQOL) measurement tools, respectively. To facilitate further discussion, a description of each one follows.

Briefly, the DQOL has four primary scales that contain a total of 46 core items (DCCT Research Group, 1988). These items are considered to be relevant for most adults, and are intended to measure self-reported satisfaction with diabetes treatment (15 items), impact of diabetes treatment (20 items), worry about the future effects of diabetes (4 items), and worry about social and vocational issues (7 items). Satisfaction items are rated from 1 (very satisfied) to 5 (very dissatisfied), and impact and worry items are rated from 1 (no impact or never worried) to 5 (always affected or always worried). Meanwhile, the SF-36 consists of multiple-item scales for eight different

health concepts: physical functioning, social functioning, bodily pain, role limitations due to physical health problems, role limitations due to emotional health problems, emotional well-being, energy and fatigue, and general health perceptions (Ware & Sherbourne, 1992). The scale scores can range from 0 to 100, with higher scores indicating better functioning.

Since their study included older adults who were expected to rate some DQOL items as not applicable, Jacobson et al. (1994) included participants' satisfaction, impact, diabetes worry, and social and vocational worry data only if they had completed at least 12, 16, 2, and 4 items, respectively. As well, detailed psychiatric information was being collected in another phase of their study, so they excluded the mental health subscale of the SF-36. Using mean scores from each remaining subscale of the SF-36 and the DQOL subscales as dependent variables, they investigated the influence of gender, age, education level, marital status, duration of diabetes, severity and number of diabetes-related complications, and current diabetes treatment regimen. Complications that were noted included proliferative retinopathy, symptomatic neuropathy, and nephropathy requiring treatment. Diabetes treatment regimens were broadly categorized as use of either diet alone, antihyperglycemic agents, or insulin.

The following statistically significant results were observed for participants who had type 2 diabetes: (a) as their ages increased, their physical functioning deteriorated; (b) those who were using insulin reported a lower level of satisfaction with, and a greater negative impact from, their current diabetes treatment regimens; (c) those who were taking antihyperglycemic agents worried more about their futures with diabetes; and (d) those who were treated with diet alone had better general health perceptions. As well,

"the pattern of relationships between marital status and quality of life suggested that separated or divorced individuals generally experienced worse quality of life than those who were single or married" (p. 270).

To examine the impact that increasing numbers and severity of diabetes-related complications had on participants' DQOL and SF-36 scores, hierarchical regression analyses were performed. Age, marital status, and treatment regimen data were entered first, followed by data regarding number and severity of complications. Not surprisingly, the number of complications that participants had emerged as a significant predictor of the extent of their role limitations due to physical health problems. It was also a significant predictor of their satisfaction with their current diabetes treatment regimens. As well, severity of diabetes complications was retained as a significant predictor of participants' physical and social functioning, bodily pain, role limitations due to physical health problems, general health, and satisfaction with and impact of their current diabetes treatment regimens. As would be expected, scores for each of the above items deteriorated as participants' number or severity of complications increased. The authors did not report on whether age, marital status, or current treatment regimen retained significance in the final predictive models.

Jacobson et al. (1994) also investigated the psychometric properties of the DQOL and the SF-36. Reliability coefficients (Cronbach alpha) were computed for the subscales of both measures for participants with type 1 and type 2 diabetes separately. The authors reported that "The Cronbach alpha coefficients ranged from 0.47 to 0.87 on the DQOL subscales and from 0.78 to 0.91 on the SF-36 subscales. Except for the lower alpha levels for the DQOL diabetes worry subscale (alpha = 0.47 and 0.49)

among type I and type II patients, respectively, these reliability coefficients were very similar to those reported previously for the two measures" (p. 269). Information about the construct validity of the DQOL and the SF-36 was derived from the observed influence of patient characteristics—i.e., type of treatment and number and severity of complications—on quality of life scores. For instance, the SF-36 was less sensitive than the DQOL to the effects of diet, antihyperglycemic agent use, or insulin treatment. Meanwhile, the SF-36 was more sensitive to changes in the number and severity of complications. The authors suggest that

...[this difference] probably reflects differences in item content with more DQOL items evaluating treatment and life experiences. Almost all SF-36 items report physical function effects. Thus, the DQOL may be especially useful for detecting quality of life effects where changes in morbidity may not be detectable, whereas the SF-36 may be a more sensitive indicator of changes in physical state. (p. 273)

It should also be noted that the DQOL, which focuses on diabetes-specific quality of life issues, would not be a valid measure of HRQOL in different illness populations or in the general population. In such cases, use of a generic HRQOL instrument, such as the SF-36, would be more appropriate.

Following Jacobson et al.'s (1994) study, Johnson et al. (1996) investigated the HRQOL of 54 people who were of Pima Indian heritage, had type 2 diabetes, and were 24 to 78 years old. Each participant completed a "health status questionnaire" that consisted of several demographic and clinical variables, as well as the 46 core items from the SF-36. Demographic variables included gender, age, family income level, and education level. Clinical variables included number of diabetes-related complications, duration of diabetes, current diabetes treatment regimen, recent fasting or random blood glucose measurements, HbA_{1c} measurements taken in the last six months, and recent hospital admissions due to diabetes.

Among the demographic variables, only age had a statistically significant influence on participants' SF-36 scores. Specifically, as participants' ages increased, their physical and social functioning deteriorated, and their role limitations due to physical and emotional health problems became greater. Meanwhile, among the clinical variables, only current treatment regimen and number of complications had a statistically significant influence. More specifically: (a) insulin use was associated with deterioration in physical and social functioning and general health perceptions, and with greater role limitations due to physical health problems; (b) antihyperglycemic agent use was associated with better physical functioning and fewer role limitations due to physical health problems; and (c) an increasing number of complications was associated with deterioration in physical and social functioning and emotional wellbeing, and with greater role limitations due to physical and emotional health problems. Although the authors warned that, "given the relatively small sample size for this study, and the fact that a convenience sample was selected, conclusions based on these results must be made with caution," they also noted that "relationships between demographic and clinical variables and SF-36 scores obtained in this sample of Pima Indians appear to be consistent with those of other diabetic patients" (p. 101).

Similar to Johnson et al. (1996), Camacho et al. (2002) investigated correlates of HRQOL among people who appeared to be under-represented in diabetes-related quality of life literature. Specifically, they chose to study a population of lower-income people that also had a relatively large representation of ethnic minorities—in this case

primarily African-American. Participants included 249 people with either type 1 or type 2 diabetes who were 18 to 87 years old, and for whom the following data were available: age, race, gender, diabetes type, current diabetes treatment regimen, presence of diabetes-related complications, duration of diabetes, perceived quality of diabetes care, knowledge of diabetes care, number of self-management hassles, number of reports of symptoms relating to legs and feet, vision quality, glycemic control, cholesterol control, blood pressure control, responses to the physical and mental health components of the SF-36, and responses to the social burden, sexual functioning, and energy and mobility scales of the Diabetes-39 questionnaire. All items were self-reported by questionnaire except the first seven, which were abstracted from participants' medical records. Responses to SF-36 and Diabetes-39 items formed the dependent variable data set.

After adjusting for the effects of all independent variables, several of Camacho et al.'s (2002) findings concerning participants with type 2 diabetes were similar to those of Jacobson et al. (1994) and Johnson et al. (1996). For instance, increasing age, insulin use, and presence of complications among participants with type 2 diabetes in each study significantly predicted worse physical functioning on the SF-36. As well, Camacho et al.'s investigation revealed the following among participants with type 2 diabetes: (a) increasing numbers of reports of symptoms relating to legs and feet predicted worse physical and mental health and worse sexual functioning; and (b) women and Caucasians had significantly better physical functioning than men and other races, respectively. Meanwhile, responses to the Diabetes-39 items revealed that, among participants with type 2 diabetes: (a) women and older participants reported

better sexual functioning; (b) increasing numbers of reports of symptoms relating to legs and feet and increasing years with diabetes predicted worse sexual functioning; and (c) lower energy and mobility was reported more often by Caucasians, and was also predicted by increasing numbers of years with diabetes and increasing numbers of reports of symptoms relating to legs and feet.

Gafvels, Lithner, and Borjeson (1993) investigated the psychological experiencesi.e., responses to diabetes onset, self-perceptions, and anxiety levels and attitudes related to having diabetes-of 488 people aged 20 to 50 years old who had either type 1 or type 2 diabetes and whose treatment required insulin. Chi-square analyses revealed that, among age, length of time with diabetes, gender, and presence of diabetes-related complications, the latter two variables appeared to have the greatest influence on the experiences of participants who had type 2 diabetes. For instance. upon being diagnosed with type 2 diabetes, more women than men reported feeling frightened. Conversely, more men than women reported feeling concerned or surprised when they were diagnosed with type 2 diabetes. As well, although more women than men worried about developing hypoglycemia or complications, they were still more likely to find positive aspects to having diabetes. For instance, "they reported that the disease had helped them to [adopt] healthier dietary and exercise habits and that having diabetes had taught them to appreciate life more and not take things for granted" (p. 770). Furthermore, more women than men reported that having diabetes positively influenced their friendships. Meanwhile, compared to their counterparts without complications, participants with complications more often reported that diabetes negatively affected their relationships with their partners, as well as their family and

social lives, leisure time activities, and working capacities. They also perceived themselves as being less healthy, although only 10% regarded themselves as being <u>unwell</u>.

Several of Gafvels et al.'s (1993) findings related to the age of participants with type 2 diabetes, as well as the length of time since they were diagnosed, are also noteworthy. For instance, although participants who were younger than 35 years old reported more often than the older participants that diabetes had negatively affected their friendships, they nevertheless also reported more often that there were positive aspects to having diabetes. Meanwhile, compared to their counterparts who had diabetes for 15 years or longer, participants who had diabetes for less than 15 years were more likely to spend time thinking about their disease. They were also more likely to report that the most difficult time that they had in coping with their diabetes was in the beginning, before they became more comfortable with their treatment regimens.

In summary, the above descriptions of studies that have aimed to investigate the broad topic of quality of life—or HRQOL—among people with type 2 diabetes highlight several common findings of related research to date. First, increasing age among people with type 2 diabetes appears to be associated with worse self-reported physical (Camacho et al., 2002; Jacobson et al., 1994; Johnson et al., 1996) and social (Johnson et al., 1996) functioning, as measured by the SF-36. However, other studies of people in the general population (Fugl-Meyer, Melin, & Fugl-Meyer, 2002) and people with mental illnesses (Mercier, Peladeau, & Tempier, 1998) have found that increasing age is significantly associated with greater satisfaction with several aspects of life. For instance, in their study of a nationally representative Swedish sample of 1207 women

and 1326 men aged 18 to 64 years, Fugl-Meyer et al. found that age was positively associated with satisfaction with family life and with vocational and financial situations. As well, after controlling for differences in gender, Mercier et al. found that, among 95 men and 70 women with mental illness, increasing age was consistently associated with increasing satisfaction with each domain of life that was investigated. These domains included place of residence, neighborhood, food, clothing, health, friends, love life, relationships with family and other people, work activities, daily activities, spare time, leisure in community, services and facilities, financial situation, life as a whole, and people lived with.

A second common finding is that, for people with type 2 diabetes, gender appears to be unrelated to scores on the SF-36 (Jacobson et al., 1994; Johnson et al., 1996), although women reported better physical functioning in one study (Camacho et al., 2002). These findings appear to be consistent with those of other studies that have found only marginal (Fugl-Meyer et al. 2002) or no (Mercier et al., 1998) influences of gender on self-reported life satisfaction. Nevertheless, Camacho et al. (2002) found that women reported better sexual functioning on the Diabetes-39. As well, Gafvels et al. (1993) found that more women than men reported feeling frightened upon being diagnosed with diabetes, and more worried about developing complications. They were also more likely to find positive aspects to having diabetes and to report that diabetes positively affected their friendships.

Third, insulin use among people with type 2 diabetes appears to be associated with worse self-reported physical (Camacho et al., 2002; Johnson et al., 1996) and social (Johnson et al., 1996) functioning, and with more limitations in role functioning due to

physical health problems (Johnson et al., 1996). As well, people with type 2 diabetes who use insulin have been found to have worse self-perceived health (Johnson et al., 1996) and they have reported being less satisfied with and more negatively impacted by their current diabetes treatment regimens (Jacobson et al., 1994) compared to those not using insulin. However, Mehta et al.'s (1999) study of people with type 2 diabetes who were allocated to different therapies—diet alone, antihyperglycemic agents, or insulin—did not reveal any significant differences in their self-reported scores for mood, cognitive mistakes, symptoms, work satisfaction, or general health.

Fourth, number of diabetes-related complications has been associated with reports of less satisfaction with current diabetes treatment regimen (Jacobson et al., 1994), worse role functioning due to physical health problems (Jacobson et al., 1994), worse emotional well-being (Johnson et al., 1996), and greater role limitations due to emotional health problems (Johnson et al., 1996) among people with type 2 diabetes. As well, Mehta et al. (1999) found that, among people with type 2 diabetes, those who had had a macrovascular complication in the last year reported worse general health, more problems with mobility and usual activities, and reduced vigor compared to those without complications. Meanwhile, those who had had a microvascular complication in the last year reported more tension and total mood disturbance than those without complications.

<u>Limitations to previous studies.</u> Perhaps most notable among the efforts of researchers to date is the general conceptualization—or lack thereof—that many seem to have of what is actually being studied: that is, quality of life. The following observation that was made by Polonsky (2000) introduces this point nicely:

In confusion and desperation, many [quality of life] researchers in diabetes seem to follow one of three rules in selecting appropriate instruments for their studies: a) use whatever everyone else seems to be using (thus, the evergrowing popularity of the Medical Outcomes Study SF-36 and its variants), b) assume that HRQOL is synonymous with psychosocial status and so use any available instrument that appears to assess some aspect of the patient's psyche (like depression), or c) choose any questionnaire, without worrying about the actual content, that has an appropriate name (i.e., includes the terms <u>quality of life</u> and <u>diabetes</u> [italics added] in its title. (p. 1)

Central to Polonsky's (2000) comment is his focus on HRQOL. Specifically, although he seems to approve of the "growing recognition that HRQOL is, in the vast majority of cases, the single most important clinical and research outcome," he recognizes that "there is significant confusion... about how it should be assessed" (p. 1). Indeed, this latter point is evident in light of the wide range of HRQOL assessment tools that exist. Briefly, these tools are commonly categorized as being either generic or disease-specific and, like other authors (e.g., Rubin, 2000; Snoek, 2000), Polonsky stresses that they should reveal a person's sense of his or her physical, emotional, and social well-being. Thus, according to this criterion, they should reveal—either in relation to a specific disease or in general—a person's sense of his or her physical, emotional, and social well-being.

Polonsky's (2000) concern was primarily with the appropriateness of diabetesspecific HRQOL instruments. Following his review of nine such instruments that are "widely-used, well-known, or have recently been published" (p. 4), he demonstrated that none of them actually evaluated diabetes-specific HRQOL in the comprehensive manner that is described above. However, following a review of Michalos' (2001) insightful discussion of the broad concept of HRQOL, it becomes evident that Polonsky's concern might have been more appropriately focused on two key issues surrounding the mere existence of the concept of HRQOL. The first issue centers on the tendency for researchers and others (e.g., Parkerson et al., 1993; Rubin, 2000; Snoek, 2000) to equate the concept of HRQOL with the World Health Organization's broad definition of health as "complete physical, mental, and social well-being" (Michalos, 2001, p. 13). As Michalos points out,

Depending on what one loads into the notions of physical, mental and social wellbeing, if one has complete physical, mental and social well-being, then the quality of one's life may well be excellent. Again, depending on what one loads into those notions, a reasonable measure of excellent health might be an equally reasonable measure of an excellent quality of life. (p. 13)

However, he also stresses that trying to make the ideas of health and quality of life equivalent "would expand our ordinary ideas of human health far beyond reasonable recognition" (p. 13). Considering the logic of this statement, it may not even be reasonable to expect to find the sufficiently comprehensive measure of diabetes-specific HRQOL that Polonsky desires.

The second problem with the concept of HRQOL concerns generic measurements of it. Specifically, among those who have been interested in the broad topic of the quality of the lives of people with diabetes, there has been an overwhelming reliance on instruments that are actually intended to measure overall <u>health status</u>. Michalos (2001) highlights this oversight very nicely in his description of two such instruments: the SF-36 and the Sickness Impact Profile. As he explains, "people often use [the] SF-36 as a measure of health-related quality of life, when in fact it was designed and validated as a generic measure of health." As well, he states that "people often use the Sickness Impact Profile as if it were a measure of the overall quality of life, although it was designed as 'a behaviorally based measure of health-related dysfunction'" (p. 16).

Unfortunately, it is common for diabetes-related quality of life researchers to confuse not only the concepts of health status and HRQOL, but also those of health status and overall quality of life. For instance, in their study, "Quality of Life in a US National Sample of Adults With Diabetes and Motility-Related Upper Gastrointestinal Symptoms," Siddique, Ricci, Stewart, Sloan, and Farup (2002) stated that their objective was "to describe the health-related quality of life of individuals with diabetes with and without motility-related upper gastrointestinal symptoms compared to individuals without diabetes" (p. 683). In fact, they aimed to achieve this objective using a shortened version of the SF-36. Ultimately, HRQOL and overall quality of life are both conceptualized using measures of health status.

As Michalos (2001) suggests, "when researchers use the SF-36 as a measure of health-related quality of life, they are begging the question about the relationship of <u>good health to good quality of life</u> because they are assuming SF-36 measures both equivalently" (p. 16). Yet, in a study of 723 residents of Prince George, British Columbia, he clearly demonstrated that when self-reported health and satisfaction with various specific domains of life—for instance, living partner, friendships, and job—were used as potential predictors of quality of life, self-reported health had relatively little influence (Michalos, Zumbo, & Hubley, 2000). It is important to note that, in their study, quality of life was operationalized as single-item measures of happiness, satisfaction with life as a whole, and satisfaction with overall quality of life. While each of these items is undoubtedly a more valid measure of a person's quality of life than the previously discussed health status measurements, I agree with Michalos' (2001) belief that, "from the point of view of a person's personal experience or feelings, the quality of

a person's life may be measured by reported happiness, [even though] there is in fact much more to life and its varied qualities than happiness" (p. 5). However, an extensive literature review did not reveal any study that operationalized quality of life as happiness, or even as satisfaction with life as a whole or overall quality of life. As well, no studies were found that investigated the relative impact that diabetes has on either self-rated health or quality of life, <u>separate</u> from other potential influences.

Present Study

The present study investigated the individual impacts that diabetes, gender, race broadly categorized as <u>Aboriginal</u> or <u>all others</u>—age, and BMI had on the way that residents of a rural British Columbia community rated their health, the healthcare services they received, their level of stress, their satisfaction with various domains of life, and their quality of life. Following the example of Michalos et al. (2000), quality of life was operationalized as happiness, satisfaction with life as a whole, and satisfaction with overall quality of life. Each of the above analyses was intended to contribute to the overall goal of determining the relative impact that diabetes had. Among the subpopulation of people with type 2 diabetes, the influences of insulin use, extent of compliance with diabetes treatment regimen, and extent of diabetes-associated morbidity on the above items were also investigated. Because this research was intended to be purely descriptive, no specific a priori hypotheses were tested.

CHAPTER II

Method

Study Community

The community that we chose to study is the Bella Coola Valley, which is located within the rugged Coastal Range Mountains of northwestern British Columbia (BC; see Figures 1 and 2). The Bella Coola Valley is part of the traditional territory of the Nuxalk First Nation, and presently, a portion of it is designated as reserve land. The majority of people living on the reserve are Aboriginal, mostly of Nuxalk descent. Also within the valley is the town of Bella Coola, which is situated next to the estuary at the mouth of the Bella Coola River. Traveling up the river, one then passes through the small valley communities of Hagensborg, Firvale, and Stuie.

<u>Access.</u> The Bella Coola Valley is one of the most remote and isolated rural communities in British Columbia. Highway 20, which provides the main access, extends 465 km west from Williams Lake across the Chilcotin plateau, through the communities of Alexis Creek, Tatla Lake, Nimpo Lake, and Anaheim Lake, before finally reaching the infamous Bella Coola hill that leads to the floor of the Bella Coola Valley. The paved highway then winds along the Atnarko and Bella Coola rivers for roughly 100 km, to the wharf at the mouth of the Bella Coola River.

The town of Bella Coola can also be accessed by air and water. Twice daily during the summer months and once daily during the remainder of the year, there is a scheduled air service between Bella Coola, Anaheim Lake, and Vancouver. As well, the Bella Coola dock provides services for commercial and pleasure boats. Twice weekly during the summer months, the BC Ferries Discovery Coast route



Figure 1. Location of the Bella Coola Valley



Figure 2. Bella Coola Region

links Bella Coola to Port Hardy on Vancouver Island. This route has been enjoyed by many tourists. However, in July 2002, it was announced that the Provincial government, BC Ferries, and local tourism interests would be examining other routing options in an effort to offset financial losses (as cited in Thommasen & Thommasen, 2003, p. 4).

<u>Economy.</u> Agriculture, mushroom harvesting, tourism, forestry, fishing, and service industries all contribute to the economy of the Bella Coola Valley (Thommasen & Thommasen, 2003, p. 5). Agriculture in the valley consists of ranching, small market gardens, and nursery and greenhouse businesses. If weather conditions are favorable, the pine mushroom (Matsutake) harvest in the fall can also contribute substantially to local individual incomes. On a larger scale, tourism in the valley has shown strong growth in the past ten years. For instance, the first heli-skiing business to be based in the valley commenced service in the winter of 2002 to 2003. Over the last few decades, however, forestry and fishing operations have been in decline.

<u>Health services.</u> The United Church Medical Health Service operates the only medical clinic and the only hospital that are found in the Bella Coola Valley. Both facilities are located in Bella Coola, but they serve a geographic region that includes the entire Bella Coola Valley, and that extends outside of the valley into Anaheim Lake, Nimpo Lake, Ocean Falls, and Bella Bella. This entire region is serviced by three physicians at any given time.

Having formerly lived in Bella Coola and worked there as a well-known and respected physician, Dr. Harvey Thommasen was able to access medical clinic chart information. According to census data, an estimated 2250 people lived in the Bella

Coola Valley in May 2001, and more than 99% had a medical clinic chart. Therefore, the Bella Coola Valley was an ideal community in which to study questions concerning disease morbidity and subjective views of both quality of life and health status.

Participatory Consultation Process and Ethics Approval

Of the estimated 2250 people lived in the Bella Coola Valley in May 2001, 910 (40%) were Aboriginal (British Columbia Vital Statistics Agency, 2003). Therefore, it is important to note that the present research project was carried out with the guidance offered in a recently published policy statement entitled, "A Guide for Health Professionals Working with Aboriginal Peoples" (Smylie, 2001). In particular, Dr. Thommasen made a sincere effort to follow the general message contained within this statement that the relationship between Aboriginal people and health care providers who are not Aboriginal should be a fair and honorable one. For instance, in 2001, he engaged in extensive consultation with the Nuxalk Band Council, as well as with local health care providers and community members at large, regarding their collective desire to study determinants of health and disease among people who lived in the Bella Coola Valley. As well, prior to collecting data, Dr. Thommasen obtained letters of support from the Nuxalk Band Council, the Bella Coola Transitional Health Authority, and the Central Coast Regional District. Copies of these letters of support are available on request. Ethics approval to do this study was obtained from the Research Ethics Board at the University of Northern British Columbia.

Data Collection

<u>Medical clinic chart review.</u> In July and August 2002, Dr. Thommasen completed a retrospective review of the approximately 2700 patient charts that belonged to the Bella

Coola Medical Clinic. There were three general purposes for this review. First, it allowed him to collect demographic information, such as the age, gender, and race of each patient. Second, he was able to check patients' addresses in order to construct a mailing list of potential survey participants. For this study, a potential participant was anyone who resided within the Bella Coola Valley and was at least 17 years old. Finally, he was able to collect health-related information such as weight and, for people with diabetes, current treatment regimen, most recent hemoglobin A_{1c} (HbA_{1c}) blood test result, and extent of co-morbidities such as retinopathy, cerebrovascular disease, neuropathy, coronary artery disease, peripheral vascular disease, and nephropathy.

Information about the above six co-morbid conditions was used to calculate an overall <u>morbidity score</u> for each person with diabetes (see Appendix). First, Dr. Thommasen searched each patient's medical clinic chart for evidence of symptoms of each condition. Those who did not appear to have any symptom of the condition were assigned a score of 1, while those with minimal, moderate, or severe symptoms were assigned scores of 2, 3, or 4, respectively. Therefore, each person ended up with six individual morbidity scores. Overall morbidity scores were then assigned as follows: (a) 1.0 (no individual morbidity score was greater than 1); (b) 2.0 (one individual morbidity score was 2, and all others were 1); (d) 3.0 (one individual morbidity score was 3, and all others were less than 3); (e) 3.5 (more than one individual morbidity score was 4, and all others were less than 4). Finally, participants were placed in one of three

morbidity categories: (a) low, if their overall morbidity scores were 1.0 or 2.0; (b) medium, if their overall morbidity scores were 2.5 or 3.0; and (c) high, if their overall morbidity scores were 3.5, 4.0, or 4.5. This morbidity scoring system was developed by Dr. Thommasen for the present study. Studies of its' validity have not yet been undertaken.

<u>Racial status and Aboriginal ancestry.</u> In addition to their medical clinic charts, information about Bella Coola Valley residents' racial status came from their answers to the question, "How would you name your cultural or ethnic background?" As I've explained below in the <u>Participants</u> subsection, this and other questions were asked to participants either verbally or in writing on a survey that was mailed to their home.

Body mass index (BMI) category. BMI is a ratio of weight (kg) to height (m²) that is used as an indicator of obesity. Current guidelines include the following BMI classifications: (a) less than 25.0, which includes both the "underweight" and the "normal weight" ranges; (b) 25.0 to 29.9, which is the "overweight" range; and (c) 30.0 or greater, which is the "obese" range (World Health Organization, 1995). Using these guidelines, Lean, Han, and Seidell (1999) found that being overweight was associated with an increased risk of having symptoms of respiratory insufficiency, low back pain, cardiovascular risk factors, type 2 diabetes, and diminished physical functioning as measured by the SF-36. Being obese was associated with a moderate to very severe risk, depending on the extent of obesity. Considering these potential impacts of being overweight or obese, each Bella Coola Valley survey participant for whom current weight and height data was available was classified according to which of the above three categories that his or her BMI fell into.
<u>Compliance with diabetes treatment regimen.</u> We were not aware of any standardized guidelines for assessing compliance with diabetes treatment regimens. Therefore, Bella Coola's Nurse Practitioner was asked to provide a crude compliance rating—1 (low), 2 (medium), or 3 (high)—for each participant who had diabetes. Because she works closely with residents who have diabetes, and was not aware of the nature of this investigation, it was expected that her rating would be the most valid, unbiased one available. However, this procedure did not allow for any measure of reliability.

Survey design and methodology. Data for the present study were derived from a set of 19 questions that were included in the 12-page Health and Quality of Life questionnaire that was constructed by Dr. Alex Michalos in the spring of 2001. For their study, "Determinants of Health and the Quality of Life in the Bella Coola Valley," Michalos, Thommasen, and Zumbo (2003) offered the Health and Quality of Life questionnaire to residents who were 17 years of age or older. Using address information that was extracted from the medical clinic chart review, this questionnaire was mailed out twice: first in August and then in November 2001. It was also distributed at the emergency department of the Bella Coola Hospital, the Bella Coola Medical Clinic, and in two local grocery stores. At the medical clinic and the grocery stores, research assistants administered the questionnaire to people who might not normally respond to a mailed survey, including elderly people and people with limited literacy. As well, two 18- to 20-year-old Nuxalk girls hand-delivered questionnaires to a number of residents in the local reserve. Average completion time for this detailed questionnaire was 30 to 40 minutes. It should be noted that, although participants were

asked if they had previously completed the questionnaire, re-sampling did occur in four cases. For those four cases, the average of the two scores that were obtained for each questionnaire item was used in analyses.

The first question from the Health and Quality of Life Questionnaire that I was interested in was borrowed from the SF-36 (Ware & Sherbourne, 1992). It asked participants to rate their general health on a scale from 1 (excellent) to 3 (good) through 5 (poor). As mentioned previously, the SF-36 has been found to have good reliability and validity (Jacobson et al., 1994). Next, I looked at 16 items that are commonly used as indicators of human quality of life (Michalos, 2001). The first 15 of these items asked participants to rate their satisfaction with 12 specific domains of their lives-for example, their housing, friendships, and financial security-and with their overall standard of living, life as a whole, and overall quality of life. The final item asked them to rate their overall happiness. All 16 quality of life items were rated by participants on a scale from 1 (very dissatisfied or unhappy) to 4 (evenly balanced) through 7 (very satisfied or happy). Speaking of these single-item, 7-point quality of life measures, Michalos (2003) quotes one author, who "showed that 'a typical survey item..., when administered by a respected survey organization to a general population sample, can be expected to yield 50-83% valid variance, 0-7% method effects variance, and 14-48% residual variance" (p. 246). As well, Michalos (2003) cites two authors who have found that a single-item happiness measure has "'performed remarkably well on many of [their]...analyses and probably provides the best single approach to measuring well-being'" (p. 246). The next question from the Health and Quality of Life Questionnaire that I looked at asked participants to rate their current life stress on a scale from 1 (very unstressful) to 4

(evenly balanced) through 7 (very stressful). Finally, I looked at a question that asked respondents to rate, from 1 (poor) to 3 (average) through 5 (excellent), the health care services that they were receiving in the Bella Coola Valley.

To simplify interpretation of the results, it was considered best if each questionnaire item's scale ran in the same direction. Therefore, I recoded the general health and life stress scales prior to data analyses, so that they ran from 1 (poor) to 3 (good) through 5 (excellent), and from 1 (very stressful) to 4 (evenly balanced) through 7 (very unstressful), respectively. With that done, each item's scale ran from the worst to the best possible choice.

In January 2002, residents aged 17 years and older who had not completed the detailed Health and Quality of Life Questionnaire were mailed a one-page abbreviated version. This version contained only the 19 questions that were discussed above. An identification number was included on each questionnaire—both the complete and abbreviated versions—so that each participant's responses could be linked to his or her clinic chart information. However, Dr. Thommasen was the only one who was able to do this. I entered responses to the 19 questions into a data file only after Dr. Thommasen had input survey identification numbers and the gender, race, age, weight, morbidity, and compliance data to which they corresponded. An information sheet was included with each mailed questionnaire.

Statistical Analysis

All data analyses were performed using the Statistical Package for the Social Sciences (SPSS) for Windows (SPSS 11.5 for Windows, 1989-2002). Differences in the mean ages (years), weights (kg), BMIs, recent HbA_{1c}s, durations of diabetes

(years), morbidity scores, compliance scores, numbers of physician visits, and total numbers of health facility visits of participants and non-participants with diabetes were investigated using independent-samples t tests. As well, the gender and race distributions of participants and non-participants with diabetes were compared using Pearson's chi-square, as were the numbers who used either antihyperglycemic agents or insulin. Independent-samples t tests were also used to investigate differences in the mean self-reported health, health care services, stress, and quality of life scores of survey participants according to whether they were male or female, Aboriginal or other, and, among those with diabetes, whether they used insulin. One-way ANOVAs were used to investigate differences in participants' mean scores when they were classified according to their diabetes status (no diabetes, diabetes associated with low levels of co-morbidity, or diabetes associated with medium or high levels of co-morbidity), their age category (17 to 45, 46 to 64, or 65 to 94), their BMI category (less than 25.0, 25.0 to 29.9, or 30.0 or greater), and, among those with diabetes, their level of compliance with their diabetes treatment regimen (low, medium, or high). Bonferroni comparisons were then made to determine which means differed. Lastly, using as independent variables those that were significantly related to participants' self-rated health, satisfaction with health, and satisfaction with overall quality of life scores in two or more of the above univariate analyses, stepwise regression analyses were performed to determine which ones retained significance when they were considered concurrently. For all of the analyses, significance was set at p < .05.

CHAPTER III

Results

Participant Characteristics

<u>Total sample.</u> After excluding patients who were younger than 17 years of age, and those who did not currently reside in the Bella Coola Valley—that is, residents of Anaheim Lake, Nimpo Lake, Ocean Falls, and Bella Bella—1734 people were eligible to complete one of the questionnaires described above. Of that number, 968 (56%) did so. Gender and disease information was available for each participant, and race and age information was available for 966 and 964 participants, respectively. Given these data, 517 participants (54%) were female, 96 (10%) had been diagnosed with diabetes, 338 (35%) were Aboriginal, and the average age was 49 years, with a range from 17 to 94 years. Presence of diabetes was based on a physician diagnosis, which in turn was based on the criteria that are outlined in the "1998 Clinical Practice Guidelines for the Management of Diabetes in Canada" (Meltzer et al., 1998).

A summary of the number of survey participants classified by gender, diabetes status, race, and age is presented in Table 1. Visual inspection of the data reveals that, for all age categories combined, and within each individual one, a proportionately greater number of women than men participated in the study compared to the number in their corresponding Bella Coola Medical Clinic populations. For instance, in the age category 17 to 29, only 44 males participated, which means that 23% of all males aged 17 to 29 who were in the Bella Coola Medical Clinic population participated. Meanwhile, in that same age category, 72 females participated, representing 37% of all females aged 17 to 29 who were in the total Bella Coola Medical Clinic population. As well,

Table 1

| | | | | | <u>, </u> |
|------------|--------------|--------------|--------------|--------------|---|
| | | Age ca | ategory | | |
| | 17 to 29 | 30 to 45 | 46 to 64 | 65 to 94 | Total |
| Group | <u>n</u> (%) |
| Gender | | | | | |
| Male | 44 (23) | 131 (45) | 187 (62) | 86 (80) | 448 (50) |
| Female | 72 (37) | 153 (55) | 196 (77) | 95 (83) | 516 (61) |
| Diabetes | | • | | | |
| Yes | 0 (0) | 12 (80) | 50 (76) | 34 (76) | 96 (76) |
| No | 116 (30) | 272 (49) | 333 (68) | 147 (83) | 868 (54) |
| Race | | | | | |
| Aboriginal | 64 (27) | 102 (41) | 122 (65) | 47 (81) | 335 (46) |
| All others | 52 (36) | 182 (57) | 261 (71) | 133 (81) | 628 (63) |
| Total | 116 (30) | 284 (50) | 383 (69) | 181 (82) | 964 (50) |

| Number of Surve | y Participants | Classified by A | ge, Gender | Diabetes Status | , and Race |
|-----------------|----------------|-----------------|------------|-----------------|------------|
| | | | | | |

<u>Note.</u> The numbers in parentheses express each <u>n</u> as a percentage of the total <u>N</u> in its corresponding clinic population. For instance, in the age category 17 to 29, only 44 males participated, which means that 23% of all males aged 17 to 29 who were in the Bella Coola Medical Clinic population participated.

while only 54% of all people without diabetes in the clinic population participated, 76% all people with diabetes did. Similarly, while only 46% of all Aboriginal people in the clinic population participated, 63% of all other people did. Interestingly, except for people with diabetes, the numbers of participants in each group—as a proportion of all people in their corresponding clinic populations—increased with increasing age. For instance, while only 23% of all males aged 17 to 29 participated, the proportions increased to 45%, 62%, and 80%, respectively, in the age categories 30 to 45, 46 to 64, and 65 to 94.

<u>Participants with diabetes.</u> Tables 2 and 3 summarize and compare 13 characteristics of people with diabetes, who were classified according to whether or not they participated in the survey. These characteristics include mean ages, weights, BMIs, HbA_{1c} values, years with diagnosed diabetes, morbidity scores, compliance scores, numbers of physician visits, and total numbers of health facility visits (Table 2), as well as gender and race distributions and proportions who were taking either oral hypoglycemic agents or insulin (Table 3). Of all these characteristics, only one differed between the two groups: The mean total number of health facility visits among those who participated in the survey was greater than that of those who did not participate (M = 21.99, SD = 17.53 and M = 14.61, SD = 13.24, respectively), t (125) = 2.15, p < .05. Mean Self-Rated Health, Health Care Services, Stress, and Quality of Life Scores

Starting with the first three survey items in Table 4, it appears as though, on average, residents of the Bella Coola Valley who participated in our survey thought that their current health was somewhere between good and very good (M = 3.20, SD = 1.03), that the health care services they received were somewhere between average

Table 2

Mean Values of Selected Characteristics of Survey Participants and non-Participants With Diabetes

| | Survey participation | | | | | | | | | |
|--------------------------------|----------------------|-----------|----------|-------|-----------|----|--|--|--|--|
| | Yes | | | | | | | | | |
| Characteristic | M | <u>SD</u> | <u>n</u> | M | <u>SD</u> | n | | | | |
| Age (years) | 60.17 | 12.03 | 96 | 59.07 | 15.27 | 31 | | | | |
| Weight (kg) | 95.92 | 21.70 | 96 | 95.11 | 23.27 | 31 | | | | |
| BMI ^a | 34.17 | 7.66 | 94 | 33.33 | 6.95 | 28 | | | | |
| HbA _{1c} ^b | 0.077 | 0.021 | 96 | 0.083 | 0.018 | 31 | | | | |
| Duration of diabetes (years) | 6.62 | 5.33 | 96 | 7.94 | 6.61 | 31 | | | | |
| Morbidity score ^c | 1.86 | 1.12 | 96 | 1.74 | 1.03 | 31 | | | | |
| Compliance score ^d | 1.81 | 0.81 | 96 | 1.84 | 0.78 | 31 | | | | |
| Physician visits ^e | 8.80 | 6.85 | 96 | 6.29 | 5.78 | 31 | | | | |
| Total health facility visits* | 21.99 | 17.53 | 96 | 14.61 | 13.24 | 31 | | | | |

^aA ratio of weight (kg) to height (m²) that is used as an indicator of obesity.

^bUsed as a monitoring tool to indicate the average blood glucose level over the previous twomonth period.

^cRated on a 4-point scale (1 = low, 4 = high), which is described in detail in the Appendix.

^dRated on a 3-point scale (1 = low, 3 = high).

^eRefers only to Bella Coola Medical Clinic physician visits.

*p < .05. (Measured using independent-samples t tests).

Table 3

Numbers and Percentages of Survey Participants and non-Participants With

Diabetes Who Have Selected Characteristics

| | Survey participation | | | | | |
|-----------------------------|----------------------|-----|----|----|--|--|
| | Y | 'es | Nc |) | | |
| Characteristic | n | % | n | % | | |
| Gender | | | | | | |
| Male | 51 | 53 | 18 | 58 | | |
| Female | 45 | 47 | 13 | 42 | | |
| Race | | | | | | |
| Aboriginal | 56 | 58 | 15 | 48 | | |
| All others | 40 | 42 | 16 | 52 | | |
| Taking oral hypoglycemic(s) | | | | | | |
| Yes | 62 | 65 | 19 | 61 | | |
| No | 34 | 35 | 12 | 39 | | |
| Taking insulin | | | | | | |
| Yes | 13 | 14 | 6 | 19 | | |
| No | 83 | 86 | 25 | 81 | | |

*p < .05. (Measured using Pearson's chi-square).

Mean Self-Rated Health, Health Care Services, Stress,

and Quality of Life Scores for Bella Coola Valley Survey

Participants

| Survey item | M | <u>SD</u> | n | | | | | | |
|--|---------------|-----------|-------------|--|--|--|--|--|--|
| Current health | 3.20 | 1.03 | 925 | | | | | | |
| Health care services | 3.45 | 1.12 | 952 | | | | | | |
| Stress | 3.52 | 1.56 | 941 | | | | | | |
| Domain-specific quality of life indicators | | | | | | | | | |
| Satisfaction with: | | | | | | | | | |
| House, apartment | 5.39 | 1.70 | 946 | | | | | | |
| Neighborhood | 5.70 | 1.52 | 945 | | | | | | |
| Family relations | 5.73 | 1.47 | 940 | | | | | | |
| Living partner | 5.88 | 1.60 | 782 | | | | | | |
| Jop | 5.01 | 1.70 | 735 | | | | | | |
| Friendships | 5.64 | 1.44 | 9 37 | | | | | | |
| Health | 4.87 | 1.61 | 933 | | | | | | |
| Religion, spirituality | 5.18 | 1.62 | 865 | | | | | | |
| Financial security | 4.36 | 1.86 | 928 | | | | | | |
| Recreation activities | 4.50 | 1.73 | 916 | | | | | | |
| Self-esteem | 5.15 | 1.55 | 927 | | | | | | |
| Personal safety | 5.75 | 1.38 | 929 | | | | | | |
| Global quality of I | life indicato | rs | <u></u> | | | | | | |
| Satisfaction with: | | | | | | | | | |
| Life as a whole | 5.43 | 1.48 | 937 | | | | | | |
| Overall standard of living | 5.36 | 1.48 | 937 | | | | | | |

Table 4, continued

Mean Self-Rated Health, Health Care Services, Stress, and Quality of Life Scores for Bella Coola Valley Survey

Participants

| Survey item | M | <u>SD</u> | <u>n</u> | | | | | |
|--|-------------|------------|----------|--|--|--|--|--|
| Global quality of life indicators | | | | | | | | |
| Satisfaction with: | | | | | | | | |
| Overall quality of life | 5.46 | 1.41 | 942 | | | | | |
| Overall happiness | 5.49 | 1.56 | 955 | | | | | |
| Note. Current health and health care services were | | | | | | | | |
| rated on 5-point scales (1 = p | ooor, 3 = g | ood, 5 = | | | | | | |
| excellent, and 1 = poor, 3 = a | iverage, 5 | = excelle | ent, | | | | | |
| respectively). All other indica | ators were | rated on | 7-point | | | | | |
| scales (1 = very stressful/dissatisfied/unhappy, 4 = | | | | | | | | |
| evenly balanced, 7 = very un | stressful/s | atisfied/h | appy). | | | | | |

and good (M = 3.45, SD = 1.12), and that their lives were somewhere between a little stressful and evenly balanced (M = 3.52, SD = 1.56). Among the 16 quality of life items, satisfaction with living partner had the highest mean score (M = 5.88, SD = 1.60) and satisfaction with financial security had the lowest mean score (M = 4.36, SD = 1.86), followed by satisfaction with recreation activities (M = 4.50, SD = 1.73).

The remainder of this section is a review of similarities and differences in the mean self-rated health, healthcare services, stress, and quality of life scores—categorized as domain-specific or global—that were obtained for: (a) the total sample of participants when diabetes status, gender, race, age, and BMI were used as independent variables; and (b) the sub-group of participants with type 2 diabetes when insulin use and extent of compliance with diabetes treatment regimen were used as independent variables.

<u>Diabetes status.</u> Starting with the first survey item in Table 5, participants without diabetes appear to have thought, on average, that their current health was somewhere between good and very good (M = 3.29, SD = 1.02), while participants with diabetes that was associated with either low (M = 2.58, SD = 0.82) or medium-to-high (M = 2.19, SD = 0.88) morbidity appear to have thought that their current health was somewhere between average and good. Indeed, participants without diabetes tended to rate their health significantly better than participants with diabetes that was associated with any level of morbidity, p < .05.

Meanwhile, participants both without diabetes and with diabetes that was associated with either low or medium-to-high morbidity appear to have thought, on average, that the health care services they received were somewhere between average and good (M = 3.44, SD = 1.11; M = 3.53, SD = 1.22; and M = 3.72, SD = 1.25,

Table 5

Mean Self-Rated Health, Health Care Services, Stress, and Quality of Life Scores for Survey Participants With and Without Diabetes

| | | | | With diabetes | | | | | | |
|---------------------------------------|-------------------|------------------|-----------|-------------------|------------------|----------|---------------------------------------|--------------------------------|----|--|
| | | | | | N | Iorbidi | ty category | | | |
| | Without | Without diabetes | | Low (1. | Low (1.0 to 2.0) | | | Medium to high (2.5 to 4.0) | | |
| Survey item | M | <u>SD</u> | <u>n</u> | M | <u>SD</u> | <u>n</u> | M | <u>SD</u> | n | |
| Current health*** | 3.29 _a | 1.02 | 833 | 2.58 _b | 0.82 | 67 | 2.19 _b | 0.88 | 27 | |
| Health care services | 3.44 | 1.11 | 859 | 3.53 | 1.22 | 66 | 3.72 | 1.25 | 29 | |
| Life stress* | 3.50 _a | 1.55 | 851 | 3.42 _a | 1.30 | 64 | 4.54 _b | 1.93 | 28 | |
| · · · · · · · · · · · · · · · · · · · | Dom | ain-spe | cific qua | lity of life in | ndicator | S | · · · · · · · · · · · · · · · · · · · | | | |
| Satisfaction with: | | | | | | | | | | |
| House, apartment*** | 5.37 _a | 1.68 | 854 | 5.09 _a | 1.98 | 66 | 6.56 _b | 0.93 | 27 | |
| Neighborhood | 5.70 | 1.52 | 852 | 5.53 | 1.50 | 66 | 6.32 | 1.16 | 28 | |
| Family relations | 5.72 | 1.47 | 848 | 5.54 | 1.55 | 65 | 6.32 | 1.12 | 28 | |
| Living partner | 5.87 | 1.60 | 719 | 5.96 | 1.76 | 45 | 6.11 | 1.23 | 18 | |
| Job | 4.98 | 1.69 | 684 | 5.30 | 1.82 | 40 | 5.58 | 1.73 | 12 | |
| Friendships | 5.61 | 1.43 | 847 | 5.89 | 1.40 | 65 | 5.73 | 1. 6 6 | 26 | |
| Health** | 4.93 _a | 1.60 | 843 | 4.32 _b | 1.57 | 63 | 4.36 _{a,b} | 1.78 | 28 | |
| Religion, spirituality | 5.14 | 1.62 | 782 | 5.41 | 1.70 | 61 | 5.83 | 1.23 | 23 | |
| Financial security | 4.36 | 1.84 | 839 | 4.06 | 2.02 | 65 | 5.00 | 1.98 | 25 | |
| Recreation activities | 4.51 | 1.71 | 831 | 4.14 | 1.86 | 63 | 4.96 | 1.98 | 23 | |
| Self-esteem | 5.15 | 1.54 | 836 | 5.02 | 1.64 | 66 | 5.62 | 1.58 | 26 | |
| Personal safety | 5.74 | 1.40 | 842 | 5.67 | 1.26 | 64 | 6.17 | 1.27 | 24 | |
| | (| Global | quality o | f life indica | tors | <u></u> | · | | | |
| Satisfaction with: | | | | | | | | | | |
| Life as a whole | 5.41 | 1.47 | 846 | 5.53 | 1.57 | 66 | 5.69 | 1.49 | 26 | |

Table 5, continued

Mean Self-Rated Health, Health Care Services, Stress, and Quality of Life Scores for Survey

Participants With and Without Diabetes

| · · · · · · · · · · · · · · · · · · · | | | | | | With di | abetes | | | |
|---------------------------------------|-----------------------|-----------|------------|------------------|--------------------|------------|-----------------------------|-----------|----------|--|
| | | | | | Morbidity category | | | | | |
| | - Without diabetes | | Low (1 | Low (1.0 to 2.0) | | | Medium to high (2.5 to 4.0) | | | |
| Survey item | M | <u>SD</u> | <u>n</u> | M | <u>SD</u> | n | M | <u>SD</u> | <u>n</u> | |
| Global quality of life indicators | | | | | | | | | | |
| Satisfaction with: | | | | | | | | | | |
| Overall standard of living | 5.36 | 1.47 | 846 | 5.24 | 1.58 | 66 | 5.54 | 1.63 | 26 | |
| Overall quality of life | 5.48 | 1.39 | 851 | 5.32 | 1.55 | 66 | 5.41 | 1.58 | 27 | |
| Overall happiness | 5.49 | 1.58 | 862 | 5.43 | 1.46 | 67 | 5.54 | 1.42 | 28 | |
| Note. Current health and he | ealth care | service | es were | rated on | 5-point s | scales (1 | = poor, 3 | = good | , 5 = | |
| excellent, and 1 = poor, 3 = | average, | 5 = exc | ellent, i | respective | ely). Ali | other ind | licators we | ere rateo | don | |
| 7-point scales (1 = very stre | essful/dis | satisfied | l/unhap | py, 4 = e\ | eniy bal | anced, 7 | ' = very ur | nstressfi | ul/ | |
| satisfied/ happy). Means in | the same | e row wi | th diffe | rent subsc | cripts dif | fer signif | icantly at p | o < .05. | lf | |
| they share a subscript, they | are not s | ignifica | ntly diffe | erent at p | < .05. | | | | | |
| *p < .05. **p ≤ .008. ***p ≤ | .001. (M | easured | d using | one-way / | ANOVA) | | | | | |

respectively), and there was no evidence that having diabetes affected their scores for this item, overall p > .05. Interestingly, while participants with diabetes that was associated with medium-to-high morbidity appear to have thought, on average, that the stress in their lives was somewhere between evenly balanced and a little unstressful (M = 4.54, SD = 1.93), participants both without diabetes and with diabetes that was associated with low morbidity appear to have thought that their lives were somewhere between a little stressful and evenly balanced (M = 3.50, SD = 1.55 and M = 3.42, SD = 1.30, respectively). Indeed, the mean level of stress that was reported by participants with diabetes that was associated with medium-to-high morbidity was significantly more favorable than the mean levels that were reported by participants both without diabetes and with diabetes that was associated with low morbidity more favorable than the mean levels that were reported by participants both without diabetes and with diabetes that was associated with low morbidity. p < .05.

For participants both without diabetes and with diabetes that was associated with low morbidity, satisfaction with living partner emerged with the highest mean score (M = 5.87, SD = 1.60 and M = 5.96, SD = 1.76, respectively) among the 16 quality of life items, while satisfaction with financial security had the lowest (M = 4.36, SD = 1.84 and M = 4.06, SD = 2.02, respectively). Meanwhile, among participants with diabetes that was associated with medium-to-high morbidity, satisfaction with house or apartment had the highest mean score (M = 6.56, SD = 0.93), and satisfaction with health had the lowest (M = 4.36, SD = 1.78).

Importantly, no mean quality of life score for participants in any category fell below 4.0 (evenly balanced). However, compared to participants without diabetes or with diabetes that was associated with low morbidity, those with diabetes that was associated with medium-to-high morbidity were, on average, significantly more satisfied

with their houses or apartments, (M = 5.37, SD = 1.68; M = 5.09, SD = 1.98; and M = 6.56, SD = 0.93, respectively), p < .05. As well, participants without diabetes were, on average, significantly more satisfied with their health (M = 4.93, SD = 1.60) than participants with diabetes that was associated with low morbidity (M = 4.32, SD = 1.57), p < .05. Interestingly, there was no significant difference in health satisfaction among participants without diabetes and those with diabetes that was associated with medium-to-high morbidity (M = 4.36, SD = 1.78), p > .05.

<u>Gender.</u> Starting with the first three survey items in Table 6, both males and females appear to have thought, on average, that their current health was somewhere between good and very good (M = 3.14, SD = 1.02 and M = 3.26, SD = 1.04, respectively) and that the health care services they received were somewhere between average and good (M = 3.44, SD = 1.11 and M = 3.47, SD = 1.13, respectively). There was no evidence that their mean scores for either of these items were significantly different, p > .05. Although both males and females also appear to have thought, on average, that their lives were somewhere between a little stressful and evenly balanced (M = 3.65, SD = 1.61 and M = 3.42, SD = 1.50, respectively), males reported significantly less life stress than females did, p < .05.

For both males and females, satisfaction with living partner (M = 5.93, SD = 1.54 and M = 5.83, SD = 1.66, respectively) once again had the highest mean score among all of the quality of life items, whereas satisfaction with financial security (M = 4.19, SD = 1.86 and M = 4.49, SD = 1.84, respectively) had the lowest mean score, followed by satisfaction with recreation activities (M = 4.57, SD = 1.71 and M = 4.44, SD = 1.74, respectively). As these data indicate, no mean quality of life score for either males or

Table 6

Mean Health, Health Care Services, Stress, and Quality of Life Scores for Male and

a

Female Survey Participants

| · · · · · · · · · · · · · · · · · · · | | Male | | F | emale | |
|---------------------------------------|-----------|-------------|-----------|---------------------------|---------------|----------|
| Survey item | M | <u>SD</u> | n | M | <u>SD</u> | <u>n</u> |
| Current health | 3.14 | 1.02 | 427 | 3.26 | 1.04 | 500 |
| Health care services | 3.44 | 1.11 | 443 | 3.47 | 1.13 | 511 |
| Life stress* | 3.65 | 1.61 | 436 | 3.42 | 1.50 | 507 |
| Domain-spe | cific qua | ality of li | fe indica | tors | | |
| Satisfaction with: | | | | | | |
| House, apartment | 5.45 | 1.62 | 441 | 5.33 | 1.77 | 506 |
| Neighborhood | 5.69 | 1.50 | 438 | 5.72 | 1.54 | 508 |
| Family relations | 5.67 | 1.49 | 437 | 5.78 | 1.46 | 504 |
| Living partner | 5.93 | 1.54 | 360 | 5.83 | 1.66 | 422 |
| Job* | 4.86 | 1.77 | 345 | 5.14 | 1.62 | 391 |
| Friendships | 5.55 | 1.40 | 436 | 5.71 | 1. 4 6 | 502 |
| Health | 4.92 | 1.56 | 433 | 4.84 | 1.65 | 501 |
| Religion, spirituality* | 5.04 | 1.62 | 393 | 5.30 | 1.62 | 473 |
| Financial security* | 4.19 | 1.86 | 428 | 4.49 | 1.84 | 501 |
| Recreation activities | 4.57 | 1.71 | 422 | 4.44 | 1.74 | 495 |
| Self-esteem | 5.21 | 1.48 | 434 | 5.10 | 1.61 | 494 |
| Personal safety | 5.74 | 1.32 | 431 | 5.75 | 1.44 | 499 |
| Global | quality c | of life inc | licators | · · · · · · · · · · · · · | | |
| Satisfaction with: | | | | | | |
| Life as a whole | 5.41 | 1.45 | 436 | 5.45 | 1.50 | 502 |
| Overall standard of living | 5.28 | 1.45 | 437 | 5.43 | 1.51 | 501 |
| Overall quality of life | 5.42 | 1.38 | 440 | 5.50 | 1.43 | 504 |

Table 6, continued

Mean Health, Health Care Services, Stress, and Quality of Life Scores for Male and Female Survey Participants

| | | Male | | | Female | | |
|------------------------------------|------------|------------|-------------|-------------|------------|------------|--|
| Survey item | M | <u>SD</u> | n | M | <u>SD</u> | <u>N</u> | |
| Glob | al quality | of life in | dicators | , | | | |
| Overall happiness | 5.39 | 1.54 | 445 | 5.58 | 1.58 | 512 | |
| Note. Current health and healt | h care ser | vices w | ere rated | on 5-point | scales (| 1 = | |
| poor, 3 = good, 5 = excellent, a | nd 1 = po | or, 3 = a | iverage, { | 5 = excelle | nt, respe | ectively). | |
| All other indicators were rated of | on 7-point | scales | (1 = very | stressful/d | issatisfie | ed/ | |
| unhappy, 4 = evenly balanced, | 7 = very u | Instress | ful/satisfi | ed/happy). | | | |
| | | | | | | | |

*p < .05. (Measured using independent-samples t tests).

females fell below 4.0 (evenly balanced). However, compared to females, males were significantly less satisfied, on average, with their jobs (M = 5.14, SD = 1.62 and M = 4.86, SD = 1.77, respectively), their religion or spirituality (M = 5.30, SD = 1.62 and M = 5.04, SD = 1.62, respectively), and their financial security (M = 4.49, SD = 1.84 and M = 4.19, SD = 1.86, respectively), p < .05.

<u>Race.</u> Starting with the first two survey items in Table 7, Aboriginals appear to have thought, on average, that their current health (M = 2.88, SD = 1.08) was somewhere between fair and good, and that the health care services (M = 2.98, SD = 1.19) they received were approximately average. Conversely, all others appear to have thought, on average, that their current health (M = 3.38, SD = 0.97) was somewhere between good and very good, and that the health care services (M = 3.70, SD = 1.00) they received were between average and good. Indeed, the group of all others rated both their current health and the health care services they received significantly more favorably than their Aboriginal counterparts, p < .001. However, both Aboriginals and all others appear to have thought, on average, that their lives were somewhere between a little stressful and evenly balanced (M = 3.61, SD = 1.51 and M = 3.48, SD = 1.58, respectively), and their mean ratings of this item were not significantly different, p > .05.

Among the 16 quality of life items, satisfaction with family relations and satisfaction with living partner had the highest mean scores for Aboriginals (M = 5.62, SD = 1.56) and all others (M = 6.03, SD = 1.45), respectively. As well, for both groups, satisfaction with financial security once again had the lowest mean score (M = 3.76, SD = 1.86 and M = 4.67, SD = 1.78 for Aboriginals and all others, respectively), followed by recreation activity satisfaction (M = 4.11, SD = 1.81 and M = 4.70, SD = 1.66 for Aboriginals and all

Mean Self-Rated Health, Health Care Services, Stress, and Quality of Life Scores for

Aboriginal and All Other Survey Participants

| | At | oorigina | 1 | All others | | | | |
|--|------------|-----------|---------|------------|-----------|----------|--|--|
| Survey item | M | <u>SD</u> | n | M | <u>SD</u> | <u>n</u> | | |
| Current health | 2.88 | 1.08 | 321 | 3.38 | .965 | 604 | | |
| Health care services | 2.98 | 1.19 | 331 | 3.70 | .999 | 621 | | |
| Life stress | 3.61 | 1.51 | 329 | 3.48 | 1.58 | 612 | | |
| Domain-specific quality of life indicators | | | | | | | | |
| Satisfaction with: | | | | | | | | |
| House, apartment ^{***} | 5.06 | 1.88 | 326 | 5.56 | 1.58 | 620 | | |
| Neighborhood | 5.32 | 1.72 | 328 | 5.91 | 1.36 | 617 | | |
| Family relations | 5.62 | 1.56 | 324 | 5.79 | 1.42 | 616 | | |
| Living partner | 5.59 | 1.83 | 266 | 6.03 | 1.45 | 516 | | |
| Job | 4.69 | 1.89 | 235 | 5.16 | 1.58 | 500 | | |
| Friendships | 5.55 | 1.55 | 324 | 5.68 | 1.37 | 613 | | |
| Health | 4.58 | 1.67 | 321 | 5.03 | 1.56 | 612 | | |
| Religion, spirituality** | 4.94 | 1.80 | 312 | 5.31 | 1.50 | 553 | | |
| Financial security | 3.76 | 1.86 | 316 | 4.67 | 1.78 | 612 | | |
| Recreation activities " | 4.11 | 1.81 | 310 | 4.70 | 1.66 | 606 | | |
| Self-esteem | 4.87 | 1.69 | 319 | 5.30 | 1.46 | 608 | | |
| Personal safety | 5.36 | 1.62 | 318 | 5.95 | 1.20 | 611 | | |
| Global o | quality of | ilife ind | icators | | <u></u> | | | |
| Satisfaction with: | | | | | | | | |
| Life as a whole | 5.31 | 1.60 | 325 | 5.49 | 1.40 | 612 | | |
| Overall standard of living | 5.07 | 1.64 | 322 | 5.51 | 1.37 | 615 | | |
| Overall quality of life | 5.28 | 1.51 | 325 | 5.56 | 1.35 | 617 | | |

Table 7, continued

Mean Self-Rated Health, Health Care Services, Stress, and Quality of Life Scores for

Aboriginal and All Other Survey Respondents

| | Α | borigina | I | A | All others | | | | | |
|--|-----------|-----------|-----------|--------------|------------|----------|--|--|--|--|
| Survey item | M | <u>SD</u> | n | M | <u>SD</u> | <u>n</u> | | | | |
| Global quality of life indicators | | | | | | | | | | |
| Overall happiness | 5.44 | 1.57 | 332 | 5.52 | 1.56 | 623 | | | | |
| Note. Current health and health ca | ire servi | ces wer | e rated c | on 5-point s | cales (1 | = poor, | | | | |
| 3 = good, 5 = excellent, and 1 = poor, 3 = average, 5 = excellent, respectively). All | | | | | | | | | | |
| other indicators were rated on 7-point scales $(1 = \text{very stressful/dissatisfied/unhappy})$. | | | | | | | | | | |

4 = evenly balanced, 7 = very unstressful/satisfied/happy).

** $p \le .008$. *** $p \le .001$. (Measured using independent-samples t tests).

others, respectively). Therefore, except for Aboriginals appearing to have been, on average, at least somewhat dissatisfied with their financial security (M = 3.76, SD =1.86), no mean quality of life score for either Aboriginals or all others fell below 4.0 (evenly balanced). Despite these similarities, however, Aboriginals' mean quality of life scores were significantly lower than those of all others for each item except overall happiness (M = 5.44, SD = 1.57 and M = 5.52, SD = 1.56, respectively) and satisfaction with family relations (M = 5.62, SD = 1.56 and M = 5.79, SD = 1.42, respectively), friendships (M = 5.55, SD = 1.55 and M = 5.68, SD = 1.37, respectively), and life as a whole (M = 5.31, SD = 1.60 and M = 5.49, SD = 1.40, respectively), p > .05.

Age. As shown in Table 8, 17- to 45- and 46- to 64-year-olds appear to have thought, on average, that their current health was somewhere between good and very good (M = 3.42, SD = 1.05 and M = 3.11, SD = 1.00, respectively), while 65- to 94-year-olds appear to have thought that their current health was somewhere between fair and good (M = 2.92, SD = 1.00). In fact, current health ratings provided by 17- to 45-year-olds were significantly higher than those provided by both 46- to 64- and 65- to 94-year-olds, p < .05. Meanwhile, participants in each age category appear to have thought, on average, that the health care services they received were somewhere between average and good (M = 3.26, SD = 1.16; M = 3.47, SD = 1.12; and M = 3.86, SD = 1.00 for 17- to 45-, 46- to 64-, and 65- to 94-year-olds, respectively). However, health care services ratings provided by 65- to 94-year-olds, p < .05. As well, health care services ratings provided by 46- to 64-year-olds were significantly higher than those provided by 17- to 45- and 46- to 64-year-olds, p < .05. As well, health care services ratings provided by 46- to 64-year-olds were significantly higher than those provided by 17- to 45- year-olds were significantly higher than those provided by 17- to 45- year-olds, p < .05. As well, health care services ratings provided by 46- to 64-year-olds were significantly higher than those provided by 17- to 45-year-olds were significantly higher than those provided by 17- to 45-year-olds were significantly higher than those provided by 17- to 45-year-olds were significantly higher than those provided by 17- to 45-year-olds were significantly higher than those provided by 17- to 45-year-olds were significantly higher than those provided by 17- to 45-year-olds were significantly higher than those provided by 17- to 45-year-olds were significantly higher than those provided by 17- to 45-year-olds were significantly higher than those provided by 17- to 45-year-olds were significantly higher than those provided by 17- to 45-year-olds

Mean Self-Rated Health, Health Care Services, Stress, and Quality of Life Scores for Survey

Participants in Different Age Categories

| · · · · · · · · · · · · · · · · · · · | Age category | | | | | | | | |
|---------------------------------------|-------------------|-----------|---------------|---------------------|-----------|----------|---------------------------------------|-----------|-------------|
| | 17 | 7 to 45 | | 4 | 6 to 64 | | 6 | 5 to 94 | |
| Survey item | M | <u>SD</u> | <u>n</u> | M | <u>SD</u> | <u>n</u> | M | <u>SD</u> | <u>n</u> |
| Current health | 3.42 _a | 1.05 | 390 | 3.11 _b | 1.00 | 367 | 2.92 _b | 1.00 | 166 |
| Health care services*** | 3.26 _a | 1.16 | 395 | 3.47 _b | 1.12 | 379 | 3.86 _c | 1.00 | 176 |
| Life stress*** | 3.31 _a | 1.45 | 394 | 3.43 _a | 1.55 | 372 | 4.21 _b | 1.63 | 173 |
| | Don | nain-sp | ecific qualit | y of life in | dicators | \$ | • • • • • • • • • • • • • • • • • • • | | |
| Satisfaction with: | · , | | | | | | | | |
| House, apartment*** | 5.12 _a | 1.75 | 395 | 5.35 _a | 1.73 | 376 | 6.04 _b | 1.34 | 172 |
| Neighborhood*** | 5.52 _a | 1.56 | 395 | 5.69 _a | 1.52 | 376 | 6.13 _b | 1.33 | 171 |
| Family relations*** | 5.58 _a | 1.49 | 394 | 5.71 _a | 1.50 | 374 | 6.10 _b | 1.30 | 169 |
| Living partner** | 5.71 _a | 1.73 | 344 | 5.92 _{a,b} | 1.53 | 320 | 6.25 _b | 1.30 | 115 |
| Job*** | 4.75 _a | 1.76 | 356 | 5.13 _b | 1.61 | 307 | 5.78 _c | 1.46 | 69 |
| Friendships*** | 5.52 _a | 1.41 | 391 | 5.54 _a | 1.47 | 374 | 6.10 _b | 1.34 | 169 |
| Health | 4.93 | 1.58 | 388 | 4.79 | 1.59 | 374 | 4.95 | 1.73 | 168 |
| Religion, spirituality*** | 4.76 _a | 1.65 | 364 | 5.31 _b | 1.61 | 347 | 5.87 _c | 1.30 | 151 |
| Financial security*** | 4.08 _a | 1.83 | 388 | 4.23 _a | 1.81 | 371 | 5.29 _b | 1.75 | 166 |
| Recreation activities*** | 4.50 _a | 1.74 | 386 | 4.33 _a | 1.72 | 369 | 4.92 _b | 1.68 | 158 |
| Self-esteem*** | 5.01 _a | 1.58 | 388 | 5.05 _a | 1.56 | 372 | 5.73 _b | 1.33 | 164 |
| Personal safety** | 5.66 _a | 1.42 | 387 | 5.71 _a | 1.36 | 371 | 6.05 _b | 1.31 | 16 8 |
| | | Global | quality of I | ife indicat | ors | | | | |
| Satisfaction with: | | | | | | | | | |
| Life as a whole*** | 5.28 _a | 1.49 | 388 | 5.36 _a | 1.53 | 375 | 5.89 _b | 1.25 | 171 |

Table 8, continued

Mean Self-Rated Health, Health Care Services, Stress, and Quality of Life Scores for Survey

| | | Age category | | | | | | | | | | | |
|-------------------------------|---------------------|--------------|------------|-------------------|-----------|------------|-------------------|-----------|-----|--|--|--|--|
| | 1 | 7 to 45 | ment e e e | 4 | 6 to 64 | | 65 to 94 | | | | | | |
| Survey item | M | <u>SD</u> | <u>n</u> | M | <u>SD</u> | <u>n</u> | M | <u>SD</u> | n | | | | |
| | | Glo | bal quali | ty of life inc | licators | | - | | | | | | |
| Satisfaction with: | | | | | | | | | | | | | |
| Overall standard of living*** | 5.25 _a | 1.46 | 389 | 5.21 _a | 1.55 | 375 | 5.95 _b | 1.25 | 170 | | | | |
| Overall quality of life** | 5.48 _{a,b} | 1.38 | 392 | 5.33 _a | 1.46 | 375 | 5.73 _b | 1.32 | 173 | | | | |
| Overall happiness | 5.53 | 1.62 | 396 | 5.41 | 1.57 | 380 | 5.57 | 1.42 | 177 | | | | |
| Note. Current healt | h and hea | Ith care | services | were rated | on 5-po | oint scale | s (1 = poor, | 3 = goo | od, | | | | |

Participants in Different Age Categories

<u>Note.</u> Current health and health care services were rated on 5-point scales (1 = poor, 3 = good, 5 = excellent, and 1 = poor, 3 = average, 5 = excellent, respectively). All other indicators were rated on 7-point scales (1 = very stressful/dissatisfied/unhappy, 4 = evenly balanced, 7 = very unstressful/ satisfied/happy). Means in the same row with different subscripts differ significantly at p < .05. If they share a subscript, they are not significantly different at p < .05.

** $p \le .008$. *** $p \le .001$. (Measured using one-way ANOVAs).

that the stress in their lives was somewhere between evenly balanced and a little unstressful (M = 4.21, SD = 1.63), 17- to 45- and 46- to 64-year-olds appear to have thought that their lives were somewhere between a little stressful and evenly balanced (M = 3.31, SD = 1.45 and M = 3.43, SD = 1.55, respectively). Indeed, life stress ratings provided by 65- to 94-year-olds were significantly lower than those provided by both 17- to 45- and 46- to 64-year-olds, p < .05.

Among the 16 quality of life indicators, satisfaction with living partner emerged with the highest mean score for participants in each age group (M = 5.71, SD = 1.73; M = 5.92, SD = 1.53; and M = 6.25, SD = 1.30 for 17- to 45-, 46- to 64-, and 65- to 94-year-olds, respectively). Conversely, among 17- to 45- and 46- to 64-year-olds, satisfaction with financial security had the lowest mean score (M = 4.08, SD = 1.83 and M = 4.23, SD = 1.81, respectively), followed by satisfaction with recreation activities (M = 4.50, SD = 1.74 and M = 4.33, respectively). Meanwhile, for 65- to 94-year-olds, satisfaction with recreation activities had the lowest mean score (M = 4.92, SD = 1.68), followed closely by satisfaction with health (M = 4.95, SD = 1.73). Importantly, no mean quality of life score for participants in any age category fell below 4.0 (evenly balanced).

Despite the similarities noted in the preceding paragraph, the only quality of life items that were not influenced by age were satisfaction with health and overall happiness, overall p > .05. For the remaining items (overall $p \le .008$), differences between means tests (Bonferroni) revealed that, on average: (a) 65- to 94-year-olds were significantly more satisfied than 17- to 45-year-olds with each of the age-affected quality of life items except overall quality of life (M = 5.73, SD = 1.32 and M = 5.48, SD = 1.38, respectively, p > .05); (b) 65- to 94-year-olds were significantly more satisfied than 46- to 64-year-

olds with each of the age-affected quality of life items except living partner (M = 6.25, SD = 1.30 and M = 5.92, SD = 1.53, respectively, p > .05); and (c) 46- to 64-year-olds were significantly more satisfied than 17- to 45-year-olds with their jobs (M = 5.13, SD = 1.61 and M = 4.75, SD = 1.76, respectively, p < .05) and their religion or spirituality (M = 5.31, SD = 1.61 and M = 4.76, SD = 1.65, respectively, p < .05).

<u>BMI.</u> Starting with the first survey item in Table 9, participants whose BMIs were either less than 25.0 or 25.0 to 29.9 appear to have thought, on average, that their current health was somewhere between good and very good (M = 3.48, SD = 1.08 and M = 3.25, SD = 1.02, respectively). Conversely, participants whose BMIs were 30.0 or greater appear to have thought that their current health was somewhere between fair and good (M = 2.90, SD = 1.00). In general, the way participants rated their health was affected by their BMIs, overall p < .001. Specifically, differences between means tests (Bonferroni) revealed that, on average: (a) current health ratings provided by participants whose BMIs were less than 25.0 were significantly higher than those provided by participants whose BMIs were either 25.0 to 29.9 or 30.0 or greater, p < .05, and (b) current health ratings provided by participants whose BMIs were 25.0 to 29.9 were significantly higher than those whose BMIs were 30.0 or greater, p < .05.

Meanwhile, participants in each BMI category appear to have thought, on average, that the health care services they received were between average and good (M = 3.56, SD = 1.10; M = 3.57, SD = 1.10; and M = 3.35, SD = 1.12 for participants whose BMIs were less than 25.0, 25.0 to 29.9, and 30.0 or greater, respectively), but that their lives were somewhere between a little stressful and evenly balanced (M = 3.46, SD = 1.50; M = 3.48, SD = 1.66; and M = 3.61, SD = 1.50 for participants whose BMIs were less than

Mean Self-Rated Health, Health Care Services, Stress, and Quality of Life Scores for Survey

Participants in Different BMI Categories

| | BMI category | | | | | | | | · . | |
|----------------------------|---------------------|-----------|-----------|------|-------------------|---------------|----------|-------------------|-----------|----------|
| | Less than 25.0 | | | 25. | 0 to 29 | .9 | 30.0 | and gre | eater | |
| Survey item | M | <u>SD</u> | <u>n</u> | | M | <u>SD</u> | n | M | <u>SD</u> | <u>n</u> |
| Current health | 3.48 _a | 1.08 | 231 | | 3.25 _b | 1.02 | 267 | 2.90 _c | 1.00 | 281 |
| Health care services* | 3.56 | 1.10 | 231 | | 3.57 | 1.10 | 274 | 3.35 | 1.12 | 288 |
| Life stress | 3.46 | 1.50 | 231 | | 3.48 | 1. 6 6 | 266 | 3.61 | 1.50 | 285 |
| | Doi | main-sp | pecific o | qua | lity of life | e indica | tors | Web | | |
| Satisfaction with: | | | | | | | | | | |
| House, apartment* | 5.55 | 1.56 | 231 | | 5.50 | 1.68 | 270 | 5.20 | 1.80 | 288 |
| Neighborhood | 5.85 | 1.38 | 231 | | 5.78 | 1.46 | 272 | 5.67 | 1.60 | 288 |
| Family relations | 5.79 | 1.32 | 229 | | 5.72 | 1.48 | 270 | 5.70 | 1.58 | 287 |
| Living partner | 5. 8 8 | 1.46 | 197 | | 5.92 | 1.54 | 218 | 5.90 | 1.66 | 233 |
| Job | 5.16 | 1.57 | 195 | | 5.10 | 1.74 | 205 | 4.92 | 1.70 | 211 |
| Friendships | 5.59 | 1.42 | 232 | | 5.66 | 1.32 | 271 | 5.66 | 1.54 | 284 |
| Health* | 4.98 | 1.62 | 228 | | 4.94 | 1.69 | 268 | 4.67 | 1.54 | 285 |
| Religion, Spirituality | 5.03 | 1.66 | 208 | | 5.24 | 1.56 | 247 | 5.19 | 1.71 | 273 |
| Financial security | 4.53 | 1.82 | 230 | | 4.43 | 1.89 | 265 | 4.23 | 1.87 | 283 |
| Recreation Activities** | 4.59 _{a,b} | 1.80 | 227 | | 4.74 _a | 1.62 | 262 | 4.28 _b | 1.76 | 277 |
| Self-esteem | 5.15 | 1.58 | 225 | | 5.30 | 1.52 | 267 | 5.11 | 1.58 | 281 |
| Personal safety | 5.94 | 1.28 | 231 | | 5.68 | 1.50 | 266 | 5.75 | 1.32 | 279 |
| | | Globa | al qualit | y of | life indi | cators | <u> </u> | | | · · · |
| Satisfaction with: | | | | | | | | | | |
| Life as a whole | 5.50 | 1.40 | 228 | | 5.41 | 1.50 | 271 | 5.44 | 1.50 | 288 |
| | | | | | | | | | | |

Table 9, continued

Mean Self-Rated Health, Health Care Services, Stress, and Quality of Life Scores for Survey

Participants in Different BMI Categories

| · · · · · · · · · · · · · · · · · · · | BMI category | | | | | | | | | |
|---------------------------------------|--------------|----------------|-----------|-------------|-----------|----------|------|------------------|-----|--|
| | Less | Less than 25.0 | | | .0 to 29 | 9.9 | 30.0 | 30.0 and greater | | |
| Survey item | M | <u>SD</u> | n | M | <u>SD</u> | <u>n</u> | M | <u>SD</u> | Ū | |
| ······ | G | lobal q | uality of | life indica | tors | | | | | |
| Overall standard of Living | 5.51 | 1.38 | 230 | 5.37 | 1.54 | 270 | 5.29 | 1.54 | 285 | |
| Overall quality of Life | 5.54 | 1.37 | 231 | 5.40 | 1.42 | 267 | 5.47 | 1.42 | 286 | |
| Overall happiness | 5.53 | 1.56 | 234 | 5.41 | 1.70 | 272 | 5.60 | 1.42 | 292 | |

<u>Note.</u> Current health and health care services were rated on 5-point scales (1 = poor, 3 = good, 5 = excellent, and 1 = poor, 3 = average, 5 = excellent, respectively). All other indicators were rated on 7-point scales (1 = very stressful/dissatisfied/unhappy, 4 = evenly balanced, 7 = very unstressful/ satisfied/happy). Means in the same row with different subscripts differ significantly at p < .05. If they share a subscript, they are not significantly different at p < .05. **p < .008. ***p ≤ .001. (Measured using one-way ANOVAs).

25.0, 25.0 to 29.9, and 30.0 or greater, respectively). Although there was evidence that the way participants rated the health care services they received was affected by their BMIs, overall p < .05, no differences between means tests (Bonferroni) were significant. There was no evidence that the way they rated their current life stress was affected by their bMIs, overall p > .05.

Among the 16 quality of life items, satisfaction with living partner emerged with the highest mean score for participants whose BMIs were either 25.0 to 29.9 (M = 5.92, SD = 1.54) or 30.0 or greater (M = 5.90, SD = 1.66), and satisfaction with personal safety had the highest mean score for participants whose BMIs were less than 25.0 (M = 5.94, SD = 1.28). Conversely, satisfaction with financial security consistently had the lowest mean score (M = 4.53, SD = 1.82; M = 4.43, SD = 1.89; and M = 4.23, SD = 1.87 for participants whose BMIs were less than 25.0, 25.0 to 29.9, and 30.0 or greater, respectively), followed by satisfaction with recreation activities (M = 4.59, SD = 1.80; M = 4.74, SD = 1.62; and M = 4.28, SD = 1.76 for participants whose BMIs were less than 25.0, 25.0 to 29.9, and 30.0 or greater that no mean quality of life score for participants in any category fell below 4.0 (evenly balanced).

Despite the similarities noted above, there is evidence that the way participants rated the quality of at least one aspect of their lives differed. For instance, compared to participants with BMIs that were 30.0 or greater, those with BMIs ranging from 25.0 to 29.9 were significantly more satisfied, on average, with their recreation activities (M = 4.28, SD = 1.76 and M = 4.74, SD = 1.62, respectively, p < .05), overall p < .008. Although there was also evidence that participants' satisfaction with their houses or apartments (M = 5.55, SD = 1.56; M = 5.50, SD = 1.68; and M = 5.20, SD = 1.80 for participants whose BMIs were less than 25.0, 25.0 to 29.9, and 30.0 or greater, respectively) and their health (M = 4.98, SD = 1.62; M = 4.94, SD = 1.69; and M = 4.67, SD = 1.54 for participants whose BMIs were less than 25.0, 25.0 to 29.9, and 30.0 or greater, respectively) was affected by their BMIs, overall p < .05, no differences between means tests (Bonferroni) were significant.

Insulin use. Regardless of whether they used insulin, participants with diabetes appeared to think, on average, that their current health was between fair and good (M = 2.00, SD = 0.82 and M = 2.54, SD = 0.84 for participants who did and did not use insulin, respectively; see Table 10). Despite this similarity, participants who used insulin rated their current health significantly lower than those who did not use insulin, p < .05. Meanwhile, both groups appeared to think, on average, that the health care services they received were somewhere between average and good (M_= 3.77, SD = 1.17 and M = 3.56, SD = 1.24 for participants who did and did not use insulin, respectively), and that their lives were somewhere between a little stressful and evenly balanced (M = 3.33, SD = 1.44 and M = 3.83, SD = 1.61 for participants who did and did not use insulin, respectively). There was no evidence that the way participants rated their health care services or their life stress was affected by whether they used insulin, p > .05.

Among the 16 quality of life indicators, satisfaction with house or apartment (M = 6.69, SD = 0.63) and satisfaction with living partner (M = 6.09, SD = 1.54) had the highest mean scores for participants who did and did not take insulin, respectively. Meanwhile, satisfaction with health (M = 3.83, SD = 1.47) and satisfaction with recreation activities (M = 4.33, SD = 1.88) had the lowest mean scores for participants

Table 10

Mean Health, Health Care Services, Stress, and Quality of Life Scores for Survey

Participants With Diabetes Who do and do not Take Insulin

| | | Yes | | | No | - <u>.</u> |
|----------------------------|------------|--------------|-------------|------|--------------|------------|
| Survey item | M | <u>SD</u> | <u>n</u> | M | <u>SD</u> | <u>n</u> |
| Current health* | 2.00 | 0.82 | 13 | 2.54 | 0.84 | 81 |
| Health care services | 3.77 | 1.17 | 13 | 3.56 | 1.24 | 82 |
| Life stress | 3.33 | 1.44 | 12 | 3.83 | 1.61 | 80 |
| Domain-spe | cific qua | lity of life | e indicator | S | · • • • • | <u> </u> |
| Satisfaction with: | | | | | | |
| House, apartment* | 6.69 | 0.63 | 13 | 5.33 | 1.92 | 80 |
| Neighborhood | 5.92 | 1.26 | 13 | 5.74 | 1.48 | 81 |
| Family relations | 5.38 | 1.66 | 13 | 5.84 | 1.44 | 80 |
| Living partner | 5.38 | 2.07 | 8 | 6.09 | 1.54 | 55 |
| Job | 5.57 | 1.51 | 7 | 5.33 | 1.85 | 45 |
| Friendships | 5.62 | 1.80 | 13 | 5.88 | 1.42 | 78 |
| Health | 3.83 | 1.47 | 12 | 4.41 | 1.65 | 79 |
| Religion, spirituality | 5.00 | 1.95 | 11 | 5.60 | 1.52 | 73 |
| Financial security | 5.17 | 1.75 | 12 | 5.35 | 1.58 | 80 |
| Recreation activities | 4.55 | 2.21 | 11 | 4.33 | 1.88 | 75 |
| Self-esteem | 5.27 | 1.56 | 11 | 5.17 | 1.66 | 81 |
| Personal safety | 6.09 | 1.22 | 11 | 5.77 | 1.29 | 77 |
| Global | quality of | f life indi | cators | | ···· · · · · | |
| Satisfaction with: | | | | | | |
| Life as a whole | 5.45 | 1.81 | 11 | 5.59 | 1.52 | 81 |
| Overall standard of living | 5.17 | 1.75 | 12 | 5.35 | 1.58 | 80 |

Table 10, continued

Mean Health, Health Care Services, Stress, and Quality of Life Scores for Survey

Participants With Diabetes Who do and do not Take Insulin

| | | Insulin use | | | | | | | | |
|---------------------------------|---------------------|---------------|-------------|--------------|-------------|-----------|--|--|--|--|
| | | Yes | | | No | | | | | |
| Survey item | M | <u>SD</u> | n | M | <u>SD</u> | N | | | | |
| Glo | bal quality | of life ind | dicators | | | | | | | |
| Satisfaction with: | | | | | | | | | | |
| Overall quality of life* | 4.36 | 1. 8 6 | 11 | 5.48 | 1.47 | 82 | | | | |
| Overall happiness | 5.08 | 1.50 | 13 | 5.52 | 1.44 | 82 | | | | |
| Note. Current health and hea | th care ser | vices we | ere rated | on 5-point | scales (| 1 = | | | | |
| poor, 3 = good, 5 = excellent, | and 1 = po | or, 3 = a | verage, | 5 = excelle | nt, respe | ctively). | | | | |
| All other indicators were rated | l on 7-point | scales | (1 = very | /stressful/c | dissatisfie | ed/ | | | | |
| unhappy, 4 = evenly balanced | , 7 = very ι | Instress | ful/satisfi | ied/happy). | | | | | | |

*p < .05. (Measured using independent-samples t tests).

who did and did not take insulin, respectively. Of all the mean quality of life scores, the only one that fell below 4.0 (evenly balanced) was satisfaction with health for participants who took insulin. However, compared to their counterparts who did not take insulin, participants who took insulin had a significantly higher mean score for satisfaction with their houses or apartments and a lower mean score for their satisfaction with the overall quality of their lives, p < .05.

<u>Compliance with diabetes treatment regimen.</u> Starting with the first three survey items in Table 11, regardless of the extent to which they complied with their recommended diabetes treatment regimens, participants with diabetes appear to have thought, on average, that their current health was somewhere between fair and good (M = 2.29, SD = 0.86; M = 2.41, SD = 0.78; and M = 2.87, SD = 0.82 for participants in the low, medium, and high compliance categories, respectively), that the healthcare services they received were somewhere between average and good (M = 3.52, SD = 1.13; M = 3.59, SD = 1.32; and M = 3.71, SD = 1.30 for participants in the low, medium, and high compliance categories, respectively), and that their lives were somewhere between a little stressful and evenly balanced (M = 3.67, SD = 1.44; M = 3.90, SD = 1.80; and M = 3.75, SD = 1.62 for participants in the low, medium, and high compliance categories in the low, medium, and high compliance categories in the low, medium, and high compliance categories in the low, medium, and high compliance categories, respectively). However, participants in the low, medium, and high compliance category rated their current health significantly worse than participants in the highest compliance category (M = 2.29, SD = 0.86) and M = 2.87, SD = 0.82, respectively), p < .05.

Among the 16 quality of life indicators, satisfaction with living partner had the highest mean score for participants in both the low (M = 6.11, SD = 1.37) and the medium (M = 6.11, SD = 1.60, respectively) compliance categories, while satisfaction with

Table 11

Mean Health, Health Care Services, Stress, and Quality of Life Scores for Survey Participants With Diabetes Who Comply Differently to Their Diabetes Management Regimens

| | Compliance category | | | | | | | | | |
|----------------------------|---------------------|-----------|----------|---------------------|-----------|----------|-------------------|-----------|----------|--|
| | L | ow (1) | | Me | dium (2 | 2) | H | ligh (3) | | |
| Survey item | M | <u>SD</u> | <u>n</u> | M | <u>SD</u> | <u>n</u> | M | <u>SD</u> | <u>n</u> | |
| Current health* | 2.29 _a | 0.86 | 42 | 2.41 _{a,b} | 0.78 | 29 | 2.87 _b | 0.82 | 23 | |
| Health care services | 3.52 | 1.13 | 42 | 3.59 | 1.32 | 29 | 3.71 | 1.30 | 24 | |
| Life stress | 3.67 | 1.44 | 39 | 3.90 | 1.80 | 29 | 3.75 | 1.62 | 24 | |
| | Do | main-sp | ecific | quality of life | indicato | rs | | | | |
| Satisfaction with: | | | | | | | | | | |
| House, apartment | 5.24 | 1.88 | 41 | 5.43 | 1.97 | 28 | 6.08 | 1.61 | 24 | |
| Neighborhood | 5.48 | 1.49 | 42 | 5.82 | 1.49 | 28 | 6.21 | 1.25 | 24 | |
| Family relations | 5.74 | 1.45 | 42 | 5.74 | 1.40 | 27 | 5.88 | 1.65 | 24 | |
| Living partner | 6.11 | 1.37 | 28 | 6.11 | 1.60 | 19 | 5.69 | 1.06 | 16 | |
| Job | 5.67 | 1.73 | 27 | 5.58 | 1.83 | 12 | 4.54 | 1.76 | 13 | |
| Friendships | 5.93 | 1.49 | 41 | 6.04 | 1.34 | 26 | 5.50 | 1.59 | 24 | |
| Health | 4.07 | 1.54 | 42 | 4.30 | 1.59 | 27 | 4.86 | 1.81 | 22 | |
| Religion, spirituality | 5.64 | 1.40 | 36 | 5.44 | 1.80 | 27 | 5.43 | 1.66 | 21 | |
| Financial security | 4.38 | 2.12 | 40 | 4.11 | 1.70 | 27 | 4.48 | 2.33 | 23 | |
| Recreation activities | 4.08 | 2.03 | 38 | 4.48 | 1.83 | 27 | 4.71 | 1.82 | 21 | |
| Self-esteem | 5.07 | 1.74 | 42 | 5.11 | 1.62 | 27 | 5.48 | 1.47 | 23 | |
| Personal safety | 5.95 | 1.34 | 39 | 5.65 | 1.20 | 26 | 5.74 | 1.29 | 23 | |
| | · · · · · | Globa | l quali | ty of life indica | ators | | | | | |
| Satisfaction with: | | | | | | | | | | |
| Life as a whole | 5.43 | 1.58 | 42 | 5.70 | 1.56 | 27 | 5.70 | 1.49 | 23 | |
| Overall standard of living | 5.28 | 1.58 | 40 | 5.36 | 1.31 | 28 | 5.38 | 1.93 | 24 | |

Table 11, continued

Mean Health, Health Care Services, Stress, and Quality of Life Scores for Survey Participants With Diabetes Who Comply Differently to Their Diabetes Management Regimens

| | | | | Complia | ince cate | egory | | | |
|-------------------------|----------|-----------|-----------|----------------|-----------|-----------|---------------|----------|------------|
| | L | ow (1) | | Me | edium (2 |) | High (3) | | |
| Survey item | M | <u>SD</u> | <u>n</u> | M | <u>SD</u> | <u>n</u> | <u>M</u> | SD | <u>n</u> |
| | | Glob | al qualit | y of life indi | cators | | | | |
| Satisfaction with: | | | | | | | | | |
| Overall quality of life | 5.18 | 1.57 | 40 | 5.48 | 1.43 | 29 | 5.46 | 1.69 | 24 |
| Overall happiness | 5.40 | 1.43 | 42 | 5.55 | 1.43 | 29 | 5.46 | 1.56 | 24 |
| Note. Current health | and heal | th care s | ervices | were rated | on 5-poi | nt scales | (1 = poor, 1) | 3 = good | <u>, b</u> |

5 = excellent, and 1 = poor, 3 = average, 5 = excellent, respectively). All other indicators were rated on 7-point scales (1 = very stressful/dissatisfied/unhappy, 4 = evenly balanced, 7 = very unstressful/ satisfied/happy). Means in the same row with different subscripts differ significantly at p < .05. If

they share a subscript, they are not significantly different at p < .05.

*p < .05. (Measured using one-way ANOVAs).

neighborhood had the highest mean score for participants in the high compliance category (M = 6.21, SD = 1.25). Conversely, satisfaction with health had the lowest mean score for participants in the low compliance category (M = 4.07, SD = 1.54), while satisfaction with financial security had the lowest mean score for participants in both the medium (M = 4.11, SD = 1.70) and the high (M = 4.48, SD = 2.33) compliance categories. As these data indicate, there was no instance for which satisfaction with any quality of life item fell below 4.0 (evenly balanced). As well, there was no evidence that the way participants rated any quality of life item was affected by their level of compliance, p > .05.

Explaining Self-Rated Health, Satisfaction With Health, and Satisfaction With Overall Quality of Life

<u>Self-rated health.</u> As previously noted, the way participants rated their current health was significantly influenced in univariate analyses by whether they had diabetes, as well as what their races, ages, and BMIs were. Stepwise regression analysis (see Table 12) revealed that, when these four independent variables were considered concurrently, each one was retained as a significant predictor of how participants rated their current health, overall p < .001. Together, they accounted for approximately 14% of the variation in participants' current health ratings. Presence of diabetes was most influential, accounting for 6% of this variation, followed by race, age, and BMI (Bs = -0.14, -0.22, -0.19, and -0.10, respectively). In a practical sense, this means that having diabetes, being Aboriginal, being over 45 years old, and having a BMI equal to or greater than 25.0 each predicted lower self-rated health, but even when these
Table 12

Summary of Stepwise Regression Analysis for Variables Predicting Self-Rated

<u>Health</u>

| Variable | B | <u>SE B</u> | ß |
|-----------------|--------|-------------|----------|
| Model 1 | | | |
| Diabetes status | -0.82 | 0.11 | -0.24*** |
| Model 2 | • • | | |
| Diabetes status | -0.71 | 0.11 | -0.21*** |
| Race | -0.40 | 0.07 | -0.19*** |
| Model 3 | | | |
| Diabetes status | -0.54 | 0.11 | -0.16*** |
| Race | -0.49 | 0.07 | -0.23*** |
| Age | -0.01 | 0.002 | -0.19*** |
| Model 4 | | | |
| Diabetes status | -0.46 | 0.11 | -0.14*** |
| Race | -0.48 | 0.07 | -0.22*** |
| Age | -0.01 | 0.002 | -0.19*** |
| BMI | -0.005 | 0.002 | -0.10*** |

<u>Note.</u> $R^2 = 0.060$ for Model 1, 0.094 for Model 2, 0.13 for Model 3, and 0.14 for Model 4. Adjusted $R^2 = 0.059$ for Model 1, 0.092 for Model 2, 0.12 for Model 3, and 0.13 for Model 4. <u>F</u> = 56.99 for Model 1, 45.90 for Model 2, 42.51 for Model 3, and 34.43 for Model 4.

800. ≥ q***

characteristics were considered concurrently, approximately 86% of the influence came from other things.

Satisfaction with health. It has also been noted that partcipants' satisfaction with their health was significantly influenced in univariate analyses by whether they had diabetes and what their ages were. However, stepwise regression analysis revealed that only the presence of diabetes (B = -0.70, SE B = 0.31, and β = -0.07) was retained as a significant predictor when these two independent variables were considered concurrently, F (1,916) = 4.96, p < .05. For this analysis, R² = 0.005 and Adjusted R² = 0.004. Therefore, we can say that, although participants who had diabetes associated with low morbidity tended to be less satisfied with their health than others, only 0.5% of this difference was explained by their diabetes status: 99.5% was left up to other things.

Satisfaction with overall quality of life. Since satisfaction with overall quality of life among the total sample of survey participants was significantly influenced in univariate analyses by both their ages and their races—that is, whether they were Aboriginal or part of the group of all others—stepwise regression analysis was used to determine the relative importance of the latter in predicting the former. Interestingly, only race (B = -0.28, SE B = 0.10, and β = -0.10) was retained as a significant predictor, F (1.937) = 8.69, p < .008. That is, being Aboriginal was associated with significantly less selfreported satisfaction with overall quality of life. For this analysis, R² = 0.009 and Adjusted R² = 0.008. Therefore, we can say that, although participants who were Aboriginal tended to be less satisfied with their health than others, only 0.9% of the variation in satisfaction between Aboriginals and all others was explained by their race:

99.1% was left up to other things.

CHAPTER IV

Discussion

If our aim is to encourage people with diabetes to adopt and maintain recommended diabetes self-care behaviors, there is a need to further understand how they view their disease and its impact on their lives. Certainly, there is evidence that diabetes does affect the physical and emotional well-being of people who have it (for example, see Jacobson et al., 1994; Johnson et al., 1996; Camacho et al., 2002; and Gafvels, et al., 1993). However, an extensive literature search did not reveal any study that has investigated the impact that diabetes has on quality of life operationalized as happiness. satisfaction with life as a whole, or satisfaction with overall quality of life. In the present study, this impact, as well as the impact that diabetes has on self-rated health, was investigated in relation to other potential influences such as gender, race, age, and BMI. Consequently, this study has provided some insight into questions such as the following: If a woman, for example, is Aboriginal, aging, and overweight or obese-all risk factors for developing diabetes (CDA, 2003)-what additional impact might developing diabetes have on her self-rated health, happiness, satisfaction with life as a whole, and satisfaction with overall quality of life that wasn't perhaps already being felt? Impact of Diabetes on Self-Rated Health

As Gafvels et al. (1993) noted, "self-perceived health has been suggested to play an important role in the adherence to diabetic management and metabolic control" (p. 772). Only with that in mind is it perhaps somewhat encouraging that, in the present study, regardless of the extent of their associated morbidity, people with diabetes appeared to think, on average, that their current health was somewhere between only

fair and good. However, Aboriginals, people over 65 years old, and obese people—that is, people who had BMIs that were 30.0 or greater—also appeared to think, on average, that their current health was somewhere between fair and good.

Like other studies (e.g., Stewart, Greenfield, Hars, et al., 1989), the present study found that self-rated health among people with diabetes was statistically significantly lower, on average, than that of people without diabetes. This finding also appears to be significant in a clinical sense. For instance, on a scale from 1 (poor) to 5 (excellent), the mean self-rated health score for people with diabetes associated with low morbidity was 0.71 units lower than that for people without diabetes, and that for people with diabetes that was associated with medium-to-high morbidity was 1.10 units lower than that for Nevertheless, Aboriginal people, people who were over 45 people without diabetes. years old, and people whose BMIs were 25.0 or greater also rated their current health significantly less favorably than all other people, people who were 45 years old or younger, and people whose BMIs were less than 25.0, respectively. These results are consistent with those of other studies that have found a deterioration in self-reported physical functioning associated with being Aboriginal (British Columbia Provincial Health Officer, 2002), and with increasing age (Jacobson et al., 1994; Johnson et al., 1996) and BMI (Lean et al., 1999). As well, in the present study, when diabetes status, race, age, and BMI were considered concurrently, each one remained a significant predictor of how participants rated their current health. Together, these factors accounted for approximately 14% of the variation in participants' current health ratings. Diabetes status was most influential, however, accounting for 6% of this variation, followed in turn by race, age, and BMI.

Considering the findings noted above, one could therefore say that, while developing diabetes would increase the likelihood that the hypothetical woman who is Aboriginal, aging, and overweight would perceive that her health is between only fair good, this would not be the only influence. Indeed, the influence of all these characteristics-that is, having diabetes and being Aboriginal, aged, and overweight, would be relatively small in comparison to the remaining unknown factors. Therefore, it seemed worthwhile to focus on the impact that having diabetes had on participants' satisfaction with their health. Certainly, it seems plausible that, even though a person may recognize that his or her current health is not good, he or she may not feel motivated to maintain or improve it if he or she is already satisfied with it. In the present study, participants' satisfaction with their health was significantly related to whether they had diabetes and by what their ages were. However, when these two factors were considered concurrently, only having diabetes was retained as a significant predictor of their satisfaction with their health. Specifically, participants who had diabetes that was associated with a low level of morbidity tended to be less satisfied with their health than those without diabetes. However, this tendency accounted for only a mere 0.5% of the variation in how satisfied participants were with their health: 99.5% was left up to other things.

Like self-rated health, satisfaction with health among participants in the present study was largely influenced by factors other than the presence of diabetes. Therefore, it may not be prudent to hope that having diabetes will be a very important source of the dissatisfaction with health that could be expected to lead to improved self-care.

Impact of Diabetes on Quality of Life

Regardless of the category that participants' ages—17 to 45, 46 to 64, or 65 to 94 or BMIs—less than 25.0, 25.0 to 29.9, or 30.0 or greater—fell into, or their genders, or even whether they had diabetes, in no case did their average satisfaction with any quality of life item appear to be less than at least evenly balanced. However, Aboriginals were at least somewhat dissatisfied with their finances. As well, the general trend among most participants was to rate their satisfaction with their living partners highest, and their satisfaction with their finances and recreation activities lowest. Two exceptions were people with diabetes—regardless of the extent of their associated morbidity—and people who were 65 to 94 years old: Satisfaction with health among these groups was rated low, on average, relative to satisfaction with all other quality of life items.

Interestingly, people with diabetes, regardless of the extent of their associated morbidities, were no more likely to be unhappy or dissatisfied with their lives as a whole or with the overall quality of their lives compared to people without diabetes. In fact, only race and age had any statistically significant relationship: Compared to all others, Aboriginal people rated their satisfaction with the overall quality of their lives lower and, compared to 46- to 64-year-olds, 65- to 94-year-olds were more satisfied with the overall quality of their lives and their lives as a whole. As well, compared to 17- to 45-year-olds, 65- to 94-year-olds were more satisfied to 17- to 45-year-olds, 65- to 94-year-olds were more satisfied with their lives as a whole.

The above findings are consistent with those of other studies. For instance, in their study of 743 residents of Prince George, British Columbia, Michalos and Zumbo (2001) found that, compared to all other people, people with Aboriginal backgrounds were also

significantly less satisfied with the overall quality of their lives. As well, like Aboriginal participants in the present study, those in Michalos and Zumbo's study were also significantly less satisfied with their house or apartment, neighborhood, living partner, health, financial security, recreation activities, and self-esteem than all other participants. Meanwhile, studies of people in the general population (Fugl-Meyer et al., 2002) and people with mental illnesses (Mercier et al., 1998) that have found that increasing age is significantly associated with greater satisfaction with several aspects of life. For instance, as noted previously, in their study of a nationally representative Swedish sample of 1207 women and 1326 men aged 18 to 64 years, Fugl-Meyer et al. found that age was positively associated with satisfaction with family life and with vocational and financial situations. As well, after controlling for differences in gender, Mercier et al. found that, among 95 men and 70 women with mental illness, increasing age was consistently associated with increasing satisfaction with each domain of life that was investigated. These domains included place of residence, neighborhood, food, clothing, health, friends, love life, relationships with family and other people, work activities, daily activities, spare time, leisure in community, services and facilities, financial situation, life as a whole, and people lived with.

Since satisfaction with overall quality of life among the total sample of participants in the present study was significantly influenced in univariate analyses by both their ages and their races, stepwise regression analysis was used to determine the relative importance of the latter in predicting the former. Interestingly, only race was retained as a significant predictor: That is, being Aboriginal was associated with significantly less self-reported satisfaction with overall quality of life. However, this explained only 0.9%

of the variation in participants' satisfaction, which means that approximately 99.1% was explained by factors other than their races, ages, genders, BMIs, or even whether they had diabetes.

Among people with diabetes, those who used insulin reported significantly less satisfaction with the overall quality of their lives than those who didn't use insulin. This finding also appears to be significant in a clinical sense. For instance, on a scale from 1 (very dissatisfied) to 7 (very satisfied), the mean satisfaction with overall quality of life score for people with diabetes that used insulin was 1.12 units lower than that for people with diabetes that did not use insulin. The above finding is also consistent with the findings of other studies (e.g., Glasgow, R., Ruggiero, L., Eakin, E., Dryfoos, J., & Chobanian, L., 1997; Jacobson, et al., 1994) that have measured quality of life using the SF-36. As well, Jacobson et al. (1994) reported that, among their sample of 240 people who had either type 1 or type 2 diabetes, those who used insulin reported a significantly greater negative impact from their diabetes treatment regimens. Thus, it may be expected that they would also report experiencing a diminished overall quality of life. Interestingly, Jacobson et al. also found that people who were taking oral hypoglycemic agents worried more about their futures with diabetes. As they suggested, "worries abut the future of diabetes are possibly stimulated by the start of a pharmacological treatment but recede once the anticipated injections begin" (p. 271). As well, they found that people who were being treated with diet alone had better general health perceptions.

Limitations

Several limitations of the present study should be noted. The first concerns the

morbidity scoring system that was used to categorize participants with diabetes according to the extent of their co-morbidities. This system relied on information that was documented in participants' medical clinic charts. Therefore, any symptom that was either not reported to the physician or not documented by the physician would not be taken into account when each participant's morbidity score was calculated. In such cases, the validity of this system would be compromised. Considering this, it is notable that only participants with diabetes that was associated with low morbidity were significantly less satisfied with their health than participants without diabetes. While this observation might be seen to lend support to the validity of the morbidity scoring system used in this study, the lack of any significant difference in the health satisfaction ratings of participants with diabetes that was associated with medium-to-high morbidity does not. Nevertheless, only 28 participants with diabetes were found to have medium-tohigh morbidity. Perhaps, if a more accurate measure of comorbidity was employed, the expected pattern might have been observed-that is, participants with medium-to-high morbidity would have been significantly less satisfied with their health than both the participants without diabetes and those with diabetes associated with low morbidity.

A second limitation of this study concerns the crude compliance rating—1 (low), 2 (medium), or 3 (high)—that Bella Coola's Nurse Practitioner assigned to each participant who had diabetes. This procedure did not allow for any measure of interrater reliability. However, we were not aware of any standardized guidelines for assessing compliance with diabetes treatment regimens. Therefore, it was expected that the Nurse Practitioner's ratings would be the most valid, unbiased ones available, particularly because she works closely with residents who have diabetes, and was not

aware of the nature of this investigation.

Conclusions

In summary, the present study investigated, among residents of a rural British Columbia population, how diabetes affects satisfaction with various specific domains of life and quality of life operationalized as happiness, satisfaction with life as a whole, and satisfaction with overall quality of life. As well, it investigated the relative impacts that diabetes has on self-rated health and quality of life, separate from other potential influences such as gender, race, age, and BMI. In doing so, it has provided some insight into answering questions about the impact that developing diabetes might have on a person's self-rated health and quality of life that wasn't perhaps already being felt. For instance, assuming that the present findings are at least generalizable to other rural British Columbia populations, one could expect that the more of the following characteristics that a person has, the lower his or her self-reported health is likely to be: presence of diabetes, Aboriginal, over 45 years of age, and overweight or obese. However, their combined influence is relatively small.

In the present study, people with diabetes did realize that they had a lower health status compared to people without diabetes. At least for people with diabetes that was associated with low morbidity, this realization was accompanied by a diminished satisfaction with their health. However, among participants who had diabetes, only those who were taking insulin appeared to be less satisfied with their overall quality of life than were participants without diabetes. Therefore, if our aim is to encourage people with diabetes to adopt and maintain recommended diabetes self-care behaviors—including using insulin—it may be useful to help them find ways to do so without feeling as though the quality of their lives is being impaired. To start, I would encourage others to duplicate this survey in their communities to determine if the results are truly comparable.

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Appendix

Morbidity Scoring System

| Morbidity rating | Criteria | | |
|-----------------------------|---|--|--|
| Eye disease | | | |
| 1. None | None known | | |
| 2. Minimal | Background retinopathy | | |
| 3. Moderate | Proliferative retinopathy; laser treatment | | |
| 4. Severe | Blindness | | |
| Cerebrovascular disease | | | |
| 1. None | None known | | |
| 2. Minimal | Carotid bruit | | |
| 3. Moderate | History of transient ischemic attack; thromboenderectomy | | |
| 4. Severe | Cerebrovascular accident | | |
| Coronary artery disease | | | |
| 1. None | None known | | |
| 2. Minimal | Angina (stable); ischemic ECG/positive stress changes | | |
| 3. Moderate | CABG; prior MI – now stable; angioplasty | | |
| 4. Severe | Post-MI or post-CABG, but still unstable (e.g., CHF or persisting angina) | | |
| Peripheral vascular disease | | | |
| 1. None | None known | | |
| 2. Minimal | Decreased/absent pedal pulses; femoral bruit | | |
| 3. Moderate | Claudication pains | | |
| 4. Severe | Bypass or amputation of toes/foot/leg; ischemia of bowel | | |
| Nephropathy | | | |

1. None

None known

| Morbidity rating | Criteria | |
|--|-------------------------|--|
| | Nephropathy | |
| 2. Minimal | Proteinuria | |
| 3. Moderate | Peritoneal/hemodialysis | |
| 4. Severe | Transplant | |
| Note. Each person's overall morbidity score was calculated based on his or her individual morbidity | | |
| ratings: (1.0) none were greater than 1.0; (2.0) one was 2.0, and all others were less than 2.0; (2.5) | | |
| more than one was 2.0, and all others were less than 2.0; (3.0) one was 3.0, and all others were less | | |

than 3.0; (3.5) more than one was greater than three, and all others were less than three; (4.0) one

was 4.0, and all other were less than 4.0; (4.5) more than one was 4.0, and all others were less than

4.0. For example, someone with proteinuria and no other known diabetes-related disease would have

an overall morbidity score of 2.0.