

A Mixed Methods Investigation of the Feasibility of a Mindfulness-Based Intervention  
for Canadian Aboriginal Adults with Type 2 Diabetes

by

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## ABSTRACT

Type 2 diabetes mellitus (T2DM) is recognized as a worldwide epidemic that is particularly problematic among indigenous populations. Canada's Aboriginal population experiences rates of T2DM up to 5.3 times higher than the non-Aboriginal population. Stress plays a role in both the development and maintenance of T2DM and stress is prevalent in the commonly disadvantaged Aboriginal population. I hypothesized that, due to its stress reduction effects, a mindfulness-based intervention (MBI) could lead to health improvements for Aboriginal adults with T2DM. I also proposed that an MBI would be appropriate for, and acceptable to, Aboriginal people whose healing traditions incorporate aspects of mind, body, and spirit and conducted a mixed methods investigation to determine the effectiveness, acceptability, and suitability of an MBI in Aboriginal adults with T2DM. I recruited participants from urban and rural centres in Manitoba, Canada who took part in an 8-week, mindfulness intervention. Effect sizes and the results of a repeated measures analyses of variance revealed that participants ( $N = 11$ ) experienced significant and clinically important reductions in blood sugar and blood pressure as well as improvements in emotional health. A thematic analysis on the qualitative data obtained through semi-structured interviews revealed that the participants overcame several challenges to participate, valued the lessons, practices, and perceived benefits of the program, and found the MBI culturally acceptable. Taken together the results support the feasibility of an MBI for Aboriginal adults with T2DM, making it a promising alternative for improving the health and lives of many Canadians.

## CO-AUTHORSHIP

The two manuscripts included in this thesis are co-authored by my advisor, Dr. Corey Mackenzie, and by Brian McLeod, an Aboriginal Elder. I am the primary author of both manuscripts and was responsible for the original conception, methods, implementation, data collection and analyses, and preparation of the manuscripts. Corey Mackenzie provided guidance throughout the project, from the study designs to editorial assistance with the manuscripts. Brian McLeod assisted with the modification and execution of the intervention and remained as a consultant throughout.

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## CHAPTER ONE: GENERAL INTRODUCTION

Type 2 diabetes mellitus (T2DM) is characterized by either the inadequate production of, or the inability to properly utilize, insulin which causes an increase in blood glucose levels that can lead to further medical problems such as cardiovascular disease, renal failure, blindness, neurological problems leading to limb loss, and death (International Diabetes Foundation, 2003). The incidence of T2DM has been steadily increasing over the past several decades, resulting in its categorization as an epidemic (Young, Reading, Elias, & O'Neil, 2000). Worldwide, an estimated 366 million people were affected by diabetes mellitus in 2011 and this number is expected to rise to 552 million by 2030 (Whiting, Guariguata, Weil, & Shaw, 2011).

The incidence of T2DM is disproportionately high in indigenous populations and other ethnic minorities worldwide (Frohlich, Ross, and Richmond, 2006; Rock, 2003). In Canada, rates of diabetes in Aboriginal people have been reported as up to 5.3 times higher than those in the non-Aboriginal Canadian average (Dyck, Osgood, Lin, Gao, & Stang, 2010; Statistics Canada, 1993). In a review of this problem, Rock (2003) reported a causal relationship between the rise of diabetes in the Aboriginal population and a number of economic and social changes experienced since the 1970s. More specifically, a link is made between the experiences of poverty and disempowerment that arose out of the move towards colonization and westernization of Aboriginal people. Others have argued that the physical and mental health disparities in Aboriginal people are linked to displacement and the loss of culture and traditional practices that were imposed through colonization (e.g., Indian and Northern Affairs, 1996; Kirmayer, Simpson, & Cargo, 2003).

Several factors are responsible for the disproportionately high prevalence of diabetes in the Canadian Aboriginal population but a major factor appears to be stress, which is prominent in the lives of Aboriginal people worldwide--often due to cultural repression, trauma, and lifestyle changes resulting from colonization (Rock, 2003). Stress is understood to play a key role in the onset and management of diabetes and this is true for both contemporary medical (conventional science) and traditional Aboriginal conceptualizations of the disease (Giles, et al., 2007). Therefore, it appears as though an intervention focused on the reduction of stress would be of particular value to this disadvantaged group within the Canadian population. One such intervention that has received much recent research attention is the Mindfulness Based Stress Reduction (MBSR) program developed at the University of Massachusetts by Jon Kabat-Zinn (2003). Numerous studies support the health benefits of MBSR in a variety of patient populations, including diabetes, and I set out to ascertain whether a mindfulness intervention that has been modified for cultural appropriateness would be helpful for, and acceptable to, an Aboriginal population with diabetes. If so, with the intervention, we may be in a position to reduce the disparity in rates of diabetes that exists between Aboriginal and non-Aboriginal Canadians. The results of this research could then be extended to other health concerns for this at-risk population, which may help to reduce other documented health disparities within the Canadian population.

### **Stress and Diabetes**

Since Hans Selye's seminal work (Selye, 1956), we have understood the harmful effects of chronic stress on physical and psychological health. The relatively new fields of psychoneuroimmunology and psychoneuroendocrinology are helping us to understand,

more fully, the connections between stress, physiology, behaviour, and disease. Through these areas of research, we now understand that stress plays a key role in both the onset and management of diabetes (Bjorntorp, Holm, & Rosmond, 1999; Lloyd, Smith, & Weinger, 2005). The effects of stress in diabetes can be explained by a biopsychosocial model of glycemic control whereby stress works directly through components of the physiological stress response system (e.g., excess cortisol increases insulin resistance) and indirectly through maladaptive stress-related behaviours (Peyrot, McMurray, & Kruger, 1999). The role of stress in diabetes is also recognized by traditional Aboriginal knowledge-keepers (Giles et al., 2007).

The stress experienced in the Canadian Aboriginal community is multiply determined by such factors as a loss of cultural identity, isolation, discrimination, trauma and abuse, unemployment, low self-worth, and poverty (Frohlich, Ross, & Richmond, 2008; Iwasaki, Bartlett, & O'Neil, 2003). Stress-related lifestyle factors also may contribute to the prevalence of the disease in this population and include poor dietary habits (consumption of low fiber, high fat foods), high rates of smoking, sedentary lifestyles, and high rates of obesity (Young, Reading, Elias, & O'Neil, 2000). A number of symptoms commonly associated with T2DM are also linked to stress such as headaches, lack of energy, anxiety, sleep interruptions, compulsive eating, difficulties with concentration, and mood swings (Rock, 2003).

Self-care behaviours such as diet management, medication adherence, physical activity, blood glucose monitoring, foot care, and physician visits are considered to be of critical importance in the management of T2DM. A multi-ethnic study of self-care behaviors indicates that self-care behaviors are better determined by stressful life

conditions than by ethnicity or other sociodemographic characteristics (Schoenberg, Traywick, Jacobs-Lawson, & Kart, 2008) suggesting that stress reduction may lead to increased self-care behaviours. Another group of researchers discovered that, although stress levels affect the degree of self-care compliance, the differences do not fully account for variation in blood glucose levels (Peyrot, McMurray, & Kruger, 1999). They concluded that stress may directly affect blood glucose levels, which further supports stress reduction as a fruitful avenue for managing diabetes.

Previous research suggests that stress management is a crucial factor in the successful treatment of diabetes (Lammers, Naliboff, & Straatmeyer, 1984; Iwasaki, Bartlett, & O'Neil, 2005). While several treatment approaches target stress reduction (Surwit et al., 2002), one treatment program appears particularly suited to address this need, the Mindfulness Based Stress Reduction (MBSR) program developed by Jon Kabat-Zinn (2003). During the MBSR program, participants are introduced to a number of practices that serve to increase their capacity for mindfulness. Kabat-Zinn (2003) defines mindfulness as a moment-to-moment, non-judgmental awareness and acceptance of thoughts, feelings, and bodily sensations. Other descriptions also emphasize an attitude of compassion or affectionate curiosity in the practice of mindfulness (Kabat-Zinn, 1994; Vallejo & Amaro, 2007). Becoming more aware, open to, and accepting of body sensations, thoughts, and emotions is proposed to ameliorate stress by facilitating the detection of early indicators of stress, ruminative thought, and physiological arousal, allowing individuals to respond to these cues with more effective coping strategies (Salmon et al., 2004).

Cognitive Behavioural Therapy (CBT) is also known for its stress management

effects. Standard CBT, however, does not emphasize body awareness and body movement, which are central to MBSR and have been identified as beneficial in the treatment of physical health conditions (Salmon, Lush, Jablonski, & Sephton, 2009) and as a crucial program consideration for individuals with diabetes (Tudor-Locke et al., 2004). Mindfulness practices promote mindful attention to health behaviors and can facilitate self-directed behaviour change, which is preferable to prescribed changes that are often used in CBT-based interventions. Also important is that MBSR practices more easily accommodate varying world-views which makes them more suitable for an Aboriginal population than CBT techniques that tend toward supporting more individualistic values (Roemer & Orsillo, 2009). An additional consideration in the choice of the most appropriate stress management program for a population with diabetes is the result of a recent study by Smith et al. (2008) which provides support for the use of MBSR over CBT group treatments for physical health conditions. The authors compared the effects of MBSR and CBT in a population of self-identified “stressed” individuals from the community. Their study revealed moderate to large statistically significant positive effects in the MBSR group for all measured variables, which included three physical health variables and four psychological health variables. In contrast, significant effects were found for only two psychological variables in the CBT group.

An additional benefit to MBSR is its experiential method of learning, which provides the foundation for continued learning beyond the completion of the program. This serves the added benefit of empowering individuals in the program to take an active role in the management their own health, something particularly important for individuals

with diabetes who, through self-care activities, can play a major role in the regulation of their symptoms.

### **Mindfulness-Based Stress Reduction**

Participants in MBSR programs learn mindfulness through a series of group sessions, usually eight weekly, 2½-hour sessions that include instruction in several meditative practices. Experiential learning, occurring through guided practices in group sessions and daily home practice, has been identified as the key to mastering mindfulness (Kabat-Zinn, 2003). To enhance this learning, group discussions focused on exploring participants' experiences with the practices are incorporated into the classes. Among the mindfulness practices taught in the MBSR program are body scans (focused attention on successive body parts), sitting meditations, mindful walking, yoga, and mindful eating. The body scan is used to "reestablish conscious contact with the body" (Vallejo & Amaro, 2009, p 194). Sitting meditations help participants to become more aware of both internal (thoughts, body sensations, and emotions) and external (e.g. sounds, ambient temperature) stimuli. As they learn to simply notice these stimuli in a non-judgmental, accepting way, participants begin to see the impermanent nature of their experiences, which allows them to act on their thoughts, feelings, and sensory experiences less impulsively (Marlatt, 1994). Mindful walking is introduced as a method to further increase awareness of the body, as is the yoga. The yoga included in the program, often referred to as "mindful movement" or "mindful stretching," are simple movements and basic postures derived from Hatha yoga. As well as enhancing non-judgmental awareness of body sensations, the practice of mindful eating heightens participant awareness of what and how they are eating. This practice can help participants become more aware of the

circumstances surrounding their food choices and the physical and emotional consequences of their eating practices (Kristeller & Hallett, 1999).

Mindfulness-based therapies, many of which were modeled after the MBSR program, are quickly emerging as effective complementary treatment alternatives for numerous health conditions (Greeson, 2008; Shigaki, Glass, & Schopp, 2006), particularly those known to be linked to stress such as psoriasis (Kabat-Zinn et al., 1998), fibromyalgia (Lush et al., 2009), cancer (Ledesma & Kumano, 2009), depression (Ma & Teasdale, 2004; Segal, Williams, & Teasdale, 2002), anxiety disorders (Hoge et al., 2013; Kim et al., 2009), eating disorders (Kristeller & Hallett, 1999), insomnia (Yook et al., 2008), and chronic pain (Kabat-Zinn, 2003). Reviews of MBSR research indicate overall treatment effect sizes for both physical and mental health improvements to be in the moderate ( $d = 0.5$ ) range (Baer, 2003; Grossman, Niemann, Schmidt, & Walach, 2004). Although most studies provide evidence of stress reduction through self-report measures, some have offered more objective biological evidence for changes in the stress response system following mindfulness training. For example, mindfulness practice has been shown to reduce the production of salivary cortisol, a biological stress marker, in cancer patients (Carlson, Speca, Faris, & Patel, 2007). Health enhancing effects on other physiological systems have also been reported. For example, improvement in immunological systems, which are closely related to, and highly affected by, the stress response system have been reported. Following mindfulness training, stronger antibody responses have been found in individuals exposed to an influenza vaccination (Davidson et al., 2003). Individuals infected with the HIV virus have shown increases in natural killer cell activity and the production of B-chemokines, which defend against viral



infections and block HIV from infecting healthy immune cells, respectively, (Robinson, Matthews, & Witek-Janusek, 2003). Mindfulness training also appears to protect the loss of helper T-cells, which are used as a measure of HIV disease progression (Creswell, Myers, Cole, & Irwin, 2009; Gonzalez-Garcia et al., 2013).

The exact mechanism for the health improvements associated with mindfulness-based interventions is not well understood at present. Shapiro, Carlson, Astin, & Freedman (2006) proposed that, when sufficiently cultivated, three main components of mindfulness cause a shift in perspective, called “reperceiving,” which allows for disidentification from the content of thoughts and emotions, allowing a person to view experiences in the present moment with greater clarity and objectivity. The three components named were: intention (e.g., self-exploration and self-regulation), attention (bare attention of experience), and attitude (e.g., acceptance, patience, openness, and kindness). Fresco, Segal, Buis, & Kennedy (2007) proposed a similar process, referred to as “decentering.” Through a shift in perception, moment-to-moment experiences can be viewed with an attenuated reaction of the stress response system, making reperceiving a possible mediating factor for the health benefits resulting from mindfulness practices. One study discovered, however, that, while increases in mindfulness mediated improvements in health and well-being following participation in MBSR program, “reperceiving” (as measured by improvements in self-regulation, values, flexibility, and exposure) was not supported as a mediator (Carmody, Baer, Lykins, & Olendzki, 2009). Other proposed mechanisms of action include relaxation, social support, and self-management but these are not yet sufficiently tested (Baer, 2003).

### **Mindfulness and Diabetes**

Apart from the known benefits of stress reduction on diabetes, mindfulness training increases body awareness, which can facilitate monitoring body sensations related to disregulated blood sugar levels, increased blood pressure, and decreased circulation in the extremities. For people with diabetes, increased body awareness also may help to reduce unhealthy lifestyle choices in reaction to stress that can aggravate symptoms.

Physical activity has been identified as an important component for diabetes treatment programs (Tudor-Locke et al., 2004). The inclusion of yoga, or mindful movement, in MBSR was not intended to directly increase exercise behaviours in participants but, instead, to address “disuse atrophy” and increase self-efficacy in the domain of physical activity, which may lead to future engagement in physical activities, including regular exercise (Kabat-Zinn, 1990). Supporting the inclusion of yoga in the program, a review of the effects of yoga on T2DM-related physiological risk factors revealed reduced blood glucose levels, lower cholesterol, reduced blood pressure and heart rate, and weight loss (Innes & Vincent, 2007). The authors cited studies using various components of yoga (physical postures, breathing techniques, meditation) and suggested that the health improvements may have occurred not only due to the increase in activity but also through reduced activation of the stress-response system, stimulation of the vagus nerve that enhances parasympathetic activity, and an increase in healthy lifestyle choices. They also identified social support as a potential mediator for the reported health improvements. Therefore, we expected the body awareness and yoga components of the MBSR program to be of particular benefit to participants with diabetes. We also expected that mindful eating would heighten awareness of food

choices and their consequences, leading participants to healthier eating habits. Based on this expectation and previous research, we placed slightly more emphasis on body awareness and mindful eating practices than is typically done in MBSR programs.

Preliminary evidence for the effectiveness of mindfulness-based interventions in the management of diabetes exists in a handful of recent studies. In a pilot study (pre-post design), participants with T2DM ( $n = 11$ ) who completed an 8-week MBSR program showed significant improvements in glycemic control at 1-month follow-up (Rosenzweig et al., 2007). The authors measured glycemic control using percent glycated hemoglobin (HbA1c) levels, a biological indicator of glycemic control providing a measure of average blood glucose levels over the previous 2-3 months. The reported treatment effect size at follow-up was large, with  $d = 0.88$ . Importantly, the mean HbA1c measure at follow-up was 7.02%, which is in line with the Canadian Diabetes Association's recommended glycemic index of  $\leq 7\%$  (Canadian Diabetes Association, 2008). The authors reported no significant changes in medication, diet, exercise, or body weight that could account for these results and hypothesized, instead, that physiological stress-response modulation may be responsible for the improved glycemic regulation. The researchers explained that a heightened stress response is associated with increases in several stress-related hormones and neurotransmitters which act to increase blood glucose and insulin resistance and that the MBSR program appears to decrease psychological reactivity to stress triggers which may lower the physiological stress response, resulting in an associated regulation in blood glucose levels. Support for the stress reduction hypothesis lies in the discovery of a significant reduction in blood pressure and in the significant reduction in depression (43%) reported as well as the trend towards reductions

in anxiety (37%) and general psychological distress (35%). The authors concluded with the recommendation for a larger, randomized clinical trial to further investigate the potential relationship between stress reduction and glycemic control.

Evidence for the applicability of mindfulness skills in the regulation of diabetes self-care behaviours is provided by a randomized controlled trial, which found that individuals attending a one-day diabetes education workshop that included mindfulness skills training experienced a significant increase in diabetes self-care behaviours at 3-month follow-up whereas those who received the diabetes education without the mindfulness component did not (Gregg, Callaghan, Hayes, & Glenn-Lawson, 2007). The authors found a moderate to large effect size ( $d = 0.68$ ) for the difference in self-care behaviours between the two groups.

Two recent randomized controlled trials further support the effectiveness of mindfulness-based interventions for diabetes. One study focused on physiological and psychological outcomes following MBSR in type 2 diabetes patients at high risk for diabetes complications (Hartmann et al., 2012). The researchers found no significant difference between the intervention group and treatment-as-usual control at post-intervention but at follow-up, MBSR participants experienced significantly lower diastolic blood pressure and improved mental health (depression, stress, and general mental health) over treatment as usual (TAU) controls. Effect sizes ranged from medium to large ( $d = .48$  to  $.71$ ). No significant difference was found in blood glucose levels. A second trial looked at the effects of Mindfulness-Based Cognitive Therapy (MBCT) on psychological variables in a group of diabetes patients with low levels of emotional well-being at baseline (van Son et al., 2013). The study revealed significantly greater

improvements in stress, anxiety, depression, and fatigue for the intervention group over the TAU control. Effect sizes were in the medium to large range ( $d = .44$  to  $.82$ ). Health-related quality of life (both physical and emotional) was also significantly greater for those in the MBCT group. No significant differences between groups were found for blood glucose, but this was a secondary outcome in this study and was measured somewhat unreliably (up to 24 weeks before and after the intervention).

### **MBSR for Aboriginal Canadians**

Through conversations with Aboriginal leaders, I came to understand that the principles and practices of mindfulness are consistent with or, at a minimum, are complementary to Aboriginal traditions that encourage taking lessons from all aspects of life. For example, the common Aboriginal tradition of fasting on the land is a practice that allows individuals to connect with themselves and to the world around them, through an open, non-judging, and accepting attitude of all internal and external experiences. The importance of considering the whole person in terms of body, mind, and spirit in treatments for Aboriginal populations (Napoli, 2002) is highly compatible with mindfulness practices. Although the mindfulness exercises taught in MBSR have their roots in Buddhist spirituality, the program does not have an explicit spiritual component to it, which ensures that the program remains equally appropriate and relevant for people from many spiritual and religious backgrounds (Kabat-Zinn, 2003). Likewise, while certain aspects of Aboriginal spirituality are inherent to some of the traditions and teachings that were utilized in the modified MBSR program, we did not include explicit spiritual teachings and practices in the program so as not to alienate those participants who identified more with Christian values than with Aboriginal spiritual traditions. As it

has been explained to me, the traditional world-view of connection to the land and to ‘all life’ is a common element in many Aboriginal traditional beliefs but the ways in which cultural traditions are practiced and shared today vary according to cultural group and/or individuals. The collaborating Aboriginal Cultural Advisor, Brian McLeod, offered the following: “Holistic world-view sharing supported with traditional teachings of the traditional laws of relationship will be the focus to provide the best possible environment of participant inclusion regardless of individual spiritual beliefs” (B. McLeod, personal communication, January 20, 2010). Further points of convergence between the two traditions include an emphasis on equality, the importance of community, compassion for others, and healing through sharing and understanding. Others have written about the compatibility of the traditions (Duran, Fox-Davis, & Allione, 2008; Yellow Bird, 2011).

Healing in the Aboriginal population involves more than just treatment for specific problems. Instead, it is considered a process involving the acknowledgement of suffering, sharing of personal struggles, ongoing introspection, and actively working towards better self-understanding (Gone, 2009). All of these aspects of the healing process are facilitated through the teachings and practices of the MBSR program. In addition, therapeutic factors identified as particularly important for healing within the Aboriginal community are also utilized in the delivery of MBSR. These include participant conditions such as understanding inner experience and taking lessons from daily living, and therapist characteristics such as empathy, acceptance and respect, role modeling, and genuineness (McCabe, 2007). Also important for healing within this community are sacred teachings, ceremonies, and rituals, which can be seamlessly incorporated into the original MBSR program.

Several factors required consideration for adapting the MBSR program for an Aboriginal population and included the involvement of community members in the intervention (French, 2004; Thompson, Gifford, & Thorpe, 2000; White, Smith, & O'Dowd, 2005), the incorporation of cultural traditions (French, 2004; Young, Reading, Elias, & O'Neil, 2000), and the inclusion of aspects of spirituality in the treatment process (Iwasaki, Bartlett, & O'Neil, 2005). In their review of health education interventions for Native Americans, LeMaster and Connell (1994) identified a number of additional methods for ensuring cultural relevance in programs for T2DM. These include: incorporating Native community leaders in the planning, implementation, and evaluation of programs; using familiar locations for the program; using culturally related images/artwork in the program materials; providing translated copies of the materials; and including traditional activities (e.g., drumming, dancing, handicrafts, feasts, songs, and story-telling) in some way. In addition, the authors emphasized that program providers should be aware of and sensitive to cultural beliefs about illnesses as well as to traditional healing practices. I considered all of these suggestions when making modifications to the MBSR program and incorporated several of them as outlined below.

I consulted with Aboriginal community leaders (cultural advisors, spiritual leaders/elders, traditional healers, & Aboriginal health services providers) throughout all aspects of the study. Being of mixed European descent (3<sup>rd</sup> generation Canadian) with no religious or spiritual affiliation other than being guided by the principles mindfulness for the majority of my adult life, I wanted to compensate for any lack of understanding of Aboriginal culture and healing processes as well as to ensure cultural relevance and sensitivity during the implementation of the program. To do so, I sought the assistance of

an Aboriginal Cultural Advisor, Brian McLeod, who was trained in mindfulness practices and acted as a co-instructor and ongoing consultant for the program. He explained that he shares teachings from many cultural heritages, with the primary three being Cree, Ojibwe, and Lakota but that he strongly believes that teachings come from all life. Together, we incorporated cultural traditions such as story-telling, drumming, and feasts into the program as well as other common traditional teachings that are consistent with the principles of mindfulness. In order to ensure inclusiveness, the cultural adaptations we used were intentionally general and not specific to any one cultural group. In addition, to facilitate instruction, we made use of a Medicine Wheel created specifically for the program. The Medicine Wheel assisted with the teaching of balance between mind, body, emotions, and spirit and the interconnectedness of all life necessary for health, which is inherent to both Aboriginal tradition (McCabe, 2008) and the spiritual foundation of mindfulness.

We conducted the modified MBSR program in the usual group class format, which emphasizes equality through the class configuration of a large circle, with the instructors being a part of the circle. This configuration and the key MBSR training component of the sharing of thoughts and feelings with other group members helped solidify a sense of community among group members and is reminiscent of traditional Aboriginal sharing-circles. The classes took place in easily accessible and well-known centres and I made an effort to provide program materials that were culturally relevant and equally accessible to all participants regardless of their education histories. The program delivery and all of the associated materials were in English only, but both instructors took care to minimize difficulties associated with language barriers.



Another consideration was the potential for barriers created by circumstances common to a lower-income, inner-city population plagued by negative stereotypes and with higher than average trauma and abuse histories (Iwasaki & Bartlett, 2006). With such a population we anticipated a sizeable attrition rate, lower than average session attendance, and poor adherence to daily home practice. Previous researchers, however, have successfully implemented MBSR programs for use with inner-city populations by making minor modifications. For example, Roth & Robbins (2004) experienced a 66% completion rate in a program delivered to an inner-city minority population by shortening the weekly sessions from 2.5 to 2 hours and asking participants to practice for 30-45 minutes per day rather than the usual 45-60 minutes per day. Although completion rates were lower than the average of 80-85% (Vibe, Hammerstrøm, Kowalski, & Bjørndal, 2010), the study demonstrated that inner-city, minority populations do have an interest in learning mindfulness practices and are willing to take measures to improve their own health through personal effort. Importantly, they found significant health improvements in the majority of health domains measured in the study. Another successful MBSR program was adapted for the purpose of relapse prevention in a low-income, inner-city population with addictions (Vallejo & Amaro, 2009). With similar modifications, I thought the program would be acceptable to Aboriginal participants and that completion rates would parallel those seen in the inner-city populations described above.

### **The Present Study**

As outlined above, the disproportionately high incidence of T2DM and its resulting health complications in Canada's Aboriginal population highlights the need for an effective and culturally relevant diabetes management intervention. With my research,

I intended to explore the possibility that, with appropriate modifications, the MBSR program could meet this need. Modeled after the pilot work done by Rosenzweig and colleagues (2007), my work was focused on determining whether the completion of an MBSR program would be associated with improved glycemic control in Aboriginal adult participants. I used a sequential mixed methods design with an initial quantitative study (pre, post, follow-up design) followed by a qualitative study. Data for both methods were collected from the same group of participants.

My dissertation is presented in a “sandwich format,” in which this general introduction is followed by two stand-alone papers representing the different methodologies applied (one published and the other accepted for publication) and a general discussion that bridges the two papers. Due to the similar background and reasoning behind both studies, there is some unavoidable redundancy among the chapters making up this dissertation but the two methods provide unique insight into the feasibility of the intervention within the Aboriginal population.

The purpose of the first, quantitative study (Chapter 2) was to investigate the effect of the modified MBSR intervention on glycemic control (as measured by levels of glycated hemoglobin; HbA1c), blood pressure, weight, diabetes self-care behaviours, and subjective ratings of psychological well-being, health-related quality of life, life satisfaction, and qualities of mindfulness. This paper was published in *Mindfulness* and was co-authored by my academic advisor, Corey Mackenzie, who provided methodological guidance and editorial assistance throughout the project and by Aboriginal Cultural Advisor, Brian McLeod, who acted as a collaborator in adapting the intervention for Aboriginal participants, a co-instructor for the initial program offering,

and a consultant throughout the project. This appears to be the first study to administer a mindfulness program to an Aboriginal population with diabetes and, as such, an important aspect of my research was to determine whether the modified MBSR program would be acceptable to, and valued by, the Aboriginal participants. To this end, the second, qualitative study (Chapter 3) built on the quantitative results by exploring the suitability, acceptability, and perceived benefits of the intervention through the directly expressed, personal experiences of the participants. A manuscript based on this study has been accepted for publication in *Mindfulness* and is co-authored by Corey Mackenzie and Brian McLeod.

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## CHAPTER TWO

Feasibility of a Mindfulness-Based Intervention for Aboriginal Adults  
with Type 2 Diabetes <sup>1</sup>

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### Abstract

Type 2 diabetes mellitus (T2DM) is recognized as a worldwide epidemic and the health concern is particularly problematic among indigenous populations. Canada's Aboriginal population experiences rates of T2DM that are 2.5 - 5.3 times higher than the non-Aboriginal population. Stress is understood to play a role in both the development and maintenance of diabetes, which makes stress reduction an avenue for health improvement in these patients. Stress is known to be an integral part of life for commonly disadvantaged Aboriginal people and we hypothesized that, due to its known stress reduction effects, a mindfulness intervention could lead to health improvements for those with T2DM. We also thought that the mind/body approach of a mindfulness intervention would be appropriate for, and acceptable to, Aboriginal people whose healing traditions incorporate aspects of mind, body, and spirit. To test the feasibility of such an approach, we recruited Aboriginal participants from urban and rural centres in Manitoba, Canada who took part in an 8-week, modified mindfulness intervention. Following the program, participants ( $N = 11$ ) experienced significant and clinically important reductions in blood sugar (HbA1c reduced by .43%,  $p = .02$ ;  $d = .37$ ) and blood pressure (mean arterial pressure reduced by 7.91 mm Hg,  $p = .05$ ;  $d = .85$ ). They also reported significant improvements in emotional health. Our small sample limits the generalizability of our findings but our results provide preliminary evidence of feasibility, which supports further exploration of the efficacy and effectiveness of mindfulness-based interventions for indigenous people with T2DM.

## Introduction

The incidence of type 2 diabetes mellitus (T2DM) has increased steadily over the past several decades, resulting in its categorization as a global epidemic (Lam & LeRoith, 2012). The International Diabetes Federation reported that 366 million people had diabetes in 2011 and this number is predicted to rise to 552 million by 2030 (Whiting, Guariguata, Weil, & Shaw, 2011). In North America, prevalence rates are disproportionately high in indigenous populations and other ethnic minorities (Frohlich, Ross, and Richmond, 2006; Rock, 2003). Canadian statistics indicate that diabetes rates in the Aboriginal population (consisting of First Nations, Metis, and Inuit people) are approximately 2.5 - 5.3 times higher than those in the non-Aboriginal Canadian population (Dyck, Osgood, Lin, Gao, & Stang, 2010; Statistics Canada, 1993). Rates are similarly disparate for American Indians and Alaskan Natives (Barnes, Adams, Powell-Griner, 2010; Burrows, Geiss, Engelgau, & Acton, 2000). Although these health disparities are not limited to diabetes, when considering diabetes alone, we must also consider its common complications and co-occurring medical problems. The urgency of the problem is highlighted when taking into account the accompanying increased rates of cardiovascular disease, renal failure, blindness, neurological problems leading to limb loss, emotional distress, and death (International Diabetes Foundation, 2011).

In a review of the diabetes epidemic in the Aboriginal population, Rock (2003) identified several factors that contribute to the disproportionately high prevalence of diabetes in the Aboriginal population, one of the major factors being stress. Stress is understood to play a key role in the onset of diabetes, as well as in its management, both by contemporary medical researchers (Lloyd, Smith, & Weinger, 2005) and by traditional

Aboriginal knowledge-keepers (Giles et al., 2007).

Stress in the Aboriginal community is multiply determined by such factors as a loss of cultural identity, isolation, discrimination, trauma and abuse, unemployment, low self-worth, and poverty (Frohlich, Ross, & Richmond, 2008; Iwasaki, Bartlett, & O'Neil, 2003). Stress-related lifestyle factors such as poor dietary choices, high rates of smoking, and sedentary lifestyles also may contribute to the prevalence of the disease in this population (Young, Reading, Elias, & O'Neil, 2000).

Engagement in critically important diabetes self-care behaviours such as monitoring dietary choices, weight management, regular exercise, and daily blood glucose testing are better determined by stressful life conditions than by ethnicity or other sociodemographic characteristics (Schoenberg, Traywick, Jacobs-Lawson, & Kart, 2008). Although self-care behaviours are crucial for diabetes management, they do not fully account for variation in blood glucose levels. Stress remains a major factor contributing to the onset and maintenance of diabetes that appears to affect blood sugar, indirectly via stress related behaviours and directly through components of the physiological stress response. The key role of stress in diabetes has resulted in the proposal of a biopsychosocial model of glycemic control (Peyrot, McMurray, and Kruger, 1999). Therefore, stress management may be a particularly important method of managing T2DM.

Indeed, extant research suggests that stress management is a crucial factor in the successful treatment of diabetes (e.g., Iwasaki, Bartlett, & O'Neil, 2005; Lammers, Naliboff, & Straatmeyer, 1984). Several stress management strategies are available (Surwit et al., 2002) including the Mindfulness Based Stress Reduction (MBSR) program



(Kabat-Zinn, 2003). During the program, participants are exposed to a number of practices that serve to increase their capacity for mindfulness, which Kabat-Zinn (1994) defines as moment-to-moment, non-judgmental awareness and acceptance of thoughts, feelings, and bodily sensations. Mindfulness also incorporates an attitude of compassion, or affectionate curiosity (Vallejo & Amaro, 2009). Becoming more aware of, open to, and accepting of body sensations, thoughts, and emotions is proposed to ameliorate stress by facilitating the detection of early indicators of stress and reducing ruminative thought and physiological arousal, allowing individuals to respond to these cues with more effective coping strategies (Salmon et al., 2004).

Mindfulness-based therapies are increasingly being identified as effective complementary treatment alternatives for many health conditions (Greeson, 2008; Shigaki, Glass, & Schopp, 2006), particularly those known to be linked to stress, including psoriasis (Kabat-Zinn et al., 1998), fibromyalgia (Lush et al., 2009), cancer (Ledesma & Kumano, 2009), eating disorders (Kristeller & Hallett, 1999), insomnia (Yook et al., 2008), chronic pain (Kabat-Zinn, 2003; Morone, Greco & Weiner, 2008), and depression (Ma & Teasdale, 2004; Segal, Williams, & Teasdale, 2002). Reviews of mindfulness research in medical populations indicate moderate overall treatment effect sizes for physical and mental health improvements with average Cohen's *d* values ranging from .42 to .59 (Baer, 2003; Grossman, Niemann, Schmidt, & Walach, 2004). The exact mechanism of action is not well understood at this time, and is beyond the scope of this study, but a reduction in stress is generally thought to mediate positive health changes directly via physiological systems and indirectly through changes in health behaviours.

Although in its infancy, emerging research on mindfulness-based interventions in the treatment of diabetes supports its effectiveness. A pilot study with a small group of 11 diabetes patients found statistically significant reductions in blood sugar (glycated hemoglobin; HbA1c), blood pressure (mean arterial pressure; MAP), and depression following participation in an MBSR program (Rosenzweig et al., 2007). A trend toward these improvements was apparent immediately after completion of the program and reached significance at a one-month follow-up. The researchers reported medium to large effect sizes (Cohen's  $d$  values ranging from .48 to .88) for improvements in HbA1c, MAP, depression, and general psychological distress but found no changes in weight or self-care behaviours, suggesting that these variables did not account for the positive health changes. While promising, the small sample size and lack of a control group limit the reliability of these results.

Another study examined the effect of a brief mindfulness-based intervention based on Acceptance and Commitment Therapy (Hayes, Strosahl, & Wilson, 1999) with a larger sample of 81 diabetes patients (Gregg, Callaghan, Hayes, & Glenn-Lawson, 2007). The researchers randomly assigned participants to a one-day education seminar that either included or did not include a mindfulness-based intervention component. They found that those in the mindfulness group achieved significantly greater glycemic control at 3-month follow-up than those in the education-only group.

Two recent, large-scale randomized controlled trials looking primarily at the effects of mindfulness-based interventions on psychological distress in diabetes patients also reported positive health changes. The Heidelberger Diabetes and Stress Study (Hartmann et al., 2012) examined the effects of MBSR on psychological distress, blood

sugar, and blood pressure in 110 diabetes outpatients. This study found no significant differences between intervention and treatment-as-usual (TAU) control groups at post-intervention. However, at one-year follow-up, MBSR participants experienced significantly lower diastolic blood pressure and improved mental health (general mental health, stress, and depression) than controls, with medium to large effect sizes (Cohen's  $d = .48$  to  $.71$ ). The DiaMind study (van Son et al., 2013) examined the effects of Mindfulness-Based Cognitive Therapy (MBCT) on emotional distress in a group of 139 diabetes outpatients with low levels of emotional well-being. These researchers found significantly greater improvements on self-reported physical and emotional (stress, anxiety, depression, and fatigue) health measures in the intervention group than in the TAU control, with effect sizes in the medium to large range (Cohen's  $d = .44$  to  $.82$ ).

Mindfulness appears to be consistent with or, at minimum, complementary to Aboriginal traditions that encourage taking lessons from all aspects of life. For example, both mindfulness practices (Kabat-Zinn, 1990) and the Aboriginal tradition of fasting on the land (B. McLeod, personal communication, January, 2010) support connections with self and the environment through an open, non-judging, and accepting attitude of all internal and external experiences. Other points of convergence between the two traditions include an emphasis on equality and the importance of connection/relationship, compassion for others, and healing through sharing and understanding.

Previous research has shown that Aboriginal communities view healing as more than just treatment for specific problems. Instead, it is considered a holistic process involving the acknowledgement of suffering, sharing of personal struggles, ongoing introspection, and actively working towards better self-understanding (Gone, 2009).

Additional therapeutic factors identified as important for healing within Aboriginal cultures include understanding inner experience and taking lessons from daily living (McCabe, 2007). McCabe also points to therapist characteristics such as empathy, acceptance and respect, role modeling, and genuineness as important for facilitating healing in Aboriginal people. All these aspects of the healing process are consistent with, and facilitated through, the teachings, practices, and instructional format of MBSR and other mindfulness-based interventions.

The MBSR class format emphasizes equality through the class configuration of a large circle, with the instructors being a part of the circle. This configuration and the key MBSR training component of the sharing of thoughts and feelings with other group members are reminiscent of traditional Aboriginal sharing-circles. The importance of considering the whole person in terms of body, mind, and spirit in treatments for Aboriginal populations (Napoli, 2002) is highly compatible with mind-body aspects of MBSR programs as well. Although the mindfulness practices taught in MBSR have their roots in Buddhist spirituality, the program does not have an explicit spiritual component to it, which ensures that the program remains equally appropriate and relevant for people from many spiritual and religious backgrounds (Kabat-Zinn, 2003).

The Aboriginal population is disproportionately affected by T2DM and its resulting health complications, necessitating effective, culturally relevant diabetes management interventions. With appropriate modifications, we believe that a mindfulness-based intervention can meet this need. This feasibility study, modeled after the pilot work done by Rosenzweig et al. (2007), is chiefly concerned with determining the effectiveness and acceptability of a culturally tailored mindfulness-based program in

an Aboriginal population with diabetes. As described by Thibane and colleagues (2010), the primary reason for conducting this feasibility study is scientific and involves the examination of a new intervention that uses a small group of participants to determine whether it is sufficiently safe, effective, and acceptable for wider application and further study.

With respect to effectiveness, the primary hypothesis was that participants completing the MBSR program would experience health improvements, including improved glycemic control (measured by levels of glycated hemoglobin, HbA1c) and reductions in blood pressure. We also expected to see improvements in subjective physical and emotional health and increases in self-care behaviours and qualities of mindfulness.

With respect to acceptability, our proposed study builds upon previous mindfulness research by adapting the MBSR program for use with a previously overlooked cultural group. This appears to be the first study to administer the program to an Aboriginal population with diabetes. As such, an important aspect of this study was to determine the social validity of the mindfulness program in an Aboriginal population. Feedback from participants concerning acceptability can be used to inform further modifications and the possibility of future applications to other common health concerns in the Aboriginal population.

## **Method**

### **Participants**

We recruited participants through community advertisements and referrals from health centres and Aboriginal cultural centres in Winnipeg, Manitoba, Canada, as well as

in rural Manitoba First Nations communities (reservations). Potential participants were eligible to participate if they were over the age of 18 years, reported a diagnosis of type 2 diabetes, self-identified as Aboriginal, and did not report current suicidal ideation, substance abuse, or active psychosis.

After approximately one year of dedicated recruitment efforts by the first author, which involved continued contact (generally weekly) with staff members at health and cultural centres who agreed to assist with referrals and the development of relationships with Aboriginal leaders in both urban and reservation settings to aid with recruitment, a total of 53 potential participants contacted the authors to express interest in the study. We lost contact with 12 of these individuals, leaving 41 people who were ultimately screened for eligibility. The challenges we had with recruitment are common in research with indigenous populations, which is likely due to factors such as a cultural history of negative experiences with researchers (lack of community consultation, disrespect for their culture, minimal communication about the research, lack of informed consent, and no ultimate benefit to the community; Hodge, Weinmann, & Roubideaux, 2000), the reluctance of health-care providers to promote the study (Sibthorpe et al., 2002), and self-exclusion due to lack of resources (transportation, child-care, time), valuing privacy, and managing the burden of poor health, low income, and other daily stressors that often come from being part of a marginalized community (Hodge, Weinmann, & Roubideaux, 2000).

### **Procedure**

To determine the feasibility of the modified intervention with our small pilot sample, we used a quasi-experimental design. All participants took part in the

intervention and data were collected at three time-points: baseline (within one week prior to the start of the intervention), post-intervention (within one week of the final session), and follow-up (approximately two months after the completion of the program).

For eligibility screening purposes at the time of recruitment, potential participants completed portions of the Mini International Neuropsychiatric Interview (MINI; Sheehan et al, 1998), a brief semi-structured diagnostic interview. We used four diagnostic sections of the instrument including modules for: Suicidality, alcohol abuse and dependence, substance use disorders, and psychotic disorders. To minimize participant risk and to help ensure the acquisition of information taught during the program, potential participants with responses indicating these possible serious mental health problems were not included in the study. We excluded two potential participants using these criteria. Once screened for interest and eligibility, we provided potential participants with written information about the study and consent forms (Appendix A), and arranged an appointment for baseline information collection.

We offered the 8-week mindfulness-based program three times, consecutively, at three different sites. We held two programs at centrally located community health centres in Winnipeg that provide substantial Aboriginal programming, and we held the third program at an elder's lodge in a rural reservation community within an hour drive of the city. Upon recruitment, we assigned participants to the next available program as geographically appropriate (i.e., urban vs. rural). We assigned seven to the initial program, eight to the second, and five to the third. Three, six, and three participants completed the program, respectively.

Data collection took place at the program sites whenever possible (in two cases, alternate arrangements were necessary for follow-up data collection). This study was approved by the University of Manitoba's Psychology/Sociology Research Ethics Board as well as by the Winnipeg Regional Health Authority Research Review Committee.

### **Considerations for Program Modification**

Some factors that required our consideration before adapting a mindfulness program for an Aboriginal population included the involvement of community members in the intervention (French, 2004; Thompson, Gifford, & Thorpe, 2000; White, Smith, & O'Dowd, 2005) and the need to incorporate cultural traditions (French, 2004; Young, Reading, Elias, & O'Neil, 2000). In their review of health education interventions for Native Americans, LeMaster and Connell (1994) identified several methods for ensuring cultural relevance in programs for T2DM. These include: incorporating the input of Native community leaders in the planning, implementation, and evaluation of programs; using familiar locations for the program; using culturally related images/artwork in the program materials; and including traditional activities (e.g., drumming, dancing, handicrafts, feasts, songs, and story-telling) if possible. In addition, they emphasized that program providers should be aware of, and sensitive to, cultural beliefs about illnesses as well as to traditional healing practices. We addressed all of these suggestions in the modifications to our intervention.

We consulted Aboriginal community leaders (cultural advisors, spiritual leaders/elders, & Aboriginal health services providers) throughout all aspects of the study. Working in collaboration with these community leaders, we modified the MBSR program and evaluated its cultural appropriateness. As indicated by McIntyre (1996),



conventionally trained psychotherapists are often not well prepared to facilitate healing in Native American clients. Therefore, to compensate for any lack of understanding of Aboriginal culture and healing processes as well as to ensure cultural relevance and sensitivity during the implementation of the program, an Aboriginal Elder who was trained in the MBSR curriculum, process, and practices, acted as a co-instructor for the initial offering of the program and remained as a consultant for the two remaining groups.

While certain aspects of Aboriginal spirituality are inherent to some Aboriginal traditions and teachings, we did not include explicit spiritual teachings and practices. The traditional world-view of connection to the land and to ‘all life’ is a common element in many Aboriginal traditional beliefs but the ways in which cultural traditions are practiced and shared today vary according to cultural group and/or individuals. One of the co-authors (BM) is an Aboriginal Elder who helped design and implement this study. He offered the following: “Holistic world-view sharing supported with traditional teachings of the traditional laws of relationship will be the focus to provide the best possible environment of participant inclusion regardless of individual spiritual beliefs.”

### **Intervention**

We modeled the intervention after Kabat-Zinn’s (2003) MBSR program. The third author, an Aboriginal Elder (BM), was instrumental in our modification of the program to better suit the needs of the Aboriginal population by incorporating culturally relevant content. For example, storytelling highlighted program lessons; we incorporated teachings on the four elements into the curriculum; and, we used a mindfulness Medicine Wheel, modified with permission from a ceremonial medicine wheel developed by the third author as an additional learning tool to illustrate the balance between mind, body,

emotions, and spirit and the interconnectedness of all life necessary for health, which is inherent to both Aboriginal tradition (McCabe, 2008) and to the spiritual foundation of mindfulness.

As with the original MBSR program, participants attended eight weekly group sessions in which they received instruction on a variety of mindfulness practices, including the body scan, mindful eating, mindful movement, walking meditation, and sitting meditation. For detailed descriptions of these practices, see Segal, Williams, and Teasdale (2002). The weekly sessions also involved activities and discussions surrounding such topics as automatic thoughts and judgments, stress reactions, and interpersonal communication. The program differed from the original MBSR program in the homogeneous nature of the participants, the inclusion of culturally relevant content, the length of weekly sessions (abbreviated to 2 hours from the recommended 2.5 hours), and the exclusion of the full day retreat. An additional change was in the expectation for home practice. We asked participants to engage in both formal (meditation) and informal (incorporated into daily activities) mindfulness practices at home, 20-30 minutes per day for a minimum of 5 days per week (reduced from 45-60 minutes per day, 7 days per week in the original program) as done by Reibel, Greeson, Brainard, and Rosenzweig (2001). See Table 1 for a brief outline of our modified program.

The primary instructor of the program and first author is a doctoral level clinical psychology student with training and experience in teaching MBSR and who met all guidelines for recommended skills and personal practices for MBSR instructors as outlined by Santorelli & Kabat-Zinn (2009). In addition, the instructor has training and experience in clinical work with an Aboriginal population plus knowledge of Aboriginal

culture and traditions gained through conversations with Aboriginal leaders and community members and through direct experience with Aboriginal practices (e.g., attendance at numerous sharing circles and sweat lodge ceremonies).

**Table 1.**

*Overview of Modified Mindfulness Intervention*

Session	Theme	Teaching*
1	Introduction; Automatic Pilot	Introductions and orientation to the program. Mindfulness begins with recognition of the tendency to be on automatic pilot and bringing awareness to present-moment experience. Medicine wheel introduced. Body scan and mindful eating practices.
2	Responding with Awareness	Become more aware of reactions and the effect of thoughts on emotional experience and behaviour. Discuss barriers to developing a regular meditation practice. Body awareness, mindful eating, breath awareness practices.
3	Air; Breath of Life	Teaching on “air” element and how it is a thread connecting all of life (breath of life), breath is intimately tied to emotional states and awareness of it can help calm emotions and quiet scattered thoughts, prompting more skillful responding. Breath awareness, mindful movement practices.
4	Earth; Rooted and Present	Teaching on “earth” element, grounded/rooted. Bring attention to the tendency to want to avoid unpleasant experiences and cling to pleasant experiences. Learning to let things be and relate differently to present moment experience. Mountain meditation, mindful eating (nut), sitting meditation (breath and body).
5	Water; Fluid/Flowing	Teaching on “water” element, value in remaining fluid. Participants invited to let go of judgments and the need to change present moment experience, learn to extend connection with a calmer and more stable state. Mindful walking, lake meditation, mindful eating (tea), sitting meditation (breath, body, sounds)
6	Fire; Movement of Life	Teaching on “fire” element, warmth/heat transforms and cleanses. Participants learn that the desire to control life causes stress and wastes valuable energy. Acceptance and patience cultivated through loving-kindness meditation. Mindful movement, sitting meditation (breath body, sounds, thoughts).
7	Connection	Discussion of relationships with self, others and life. Learn to recognize the effect of our internal experience on those relations. Mindful communication, loving-kindness and forgiveness, sitting meditation (choiceless awareness).
8	Wholeness	Discussion on wholeness/personal wisdom and planning an ongoing mindfulness practice to support a balanced life. Choiceless awareness and body scan practices. End of program discussion.

\*Sessions always included sharing of experience with the practices and often involved discussions around living with diabetes and living as part of a marginalized community. Informal daily practices strongly encouraged throughout.

The sessions took place at easily accessible centres. To support attendance by participants anticipated to be of a lower socioeconomic demographic, we provided healthy snacks at each session, bus fare for all urban-living participants, and arrangement of transportation for rural participants, as necessary. At the time of recruitment, we offered child-care, but none of the participants expressed the desire for this service.

## **Measures**

**Demographic measures.** We collected basic demographic information at the beginning of the study (age, gender, Aboriginal status, marital status, education level, employment status, residence location, family income), as well as information on duration of diabetes and diabetes education and treatment. We also collected this diabetes-related information at post-intervention and follow-up assessment periods.

**Physiological measures.** We determined average blood glucose using glycated hemoglobin (HbA1c) levels, a biological indicator of glycemic control that provides a measure of the average blood glucose levels over the previous two to three months. Finger lancing produced small blood samples that were processed immediately using the A1Cnow+, a portable, digital HbA1c analysis device manufactured by Bayer Diagnostics providing highly accurate readings that are 99% correlated with gold-standard laboratory analyses (Bode, Irvin, Pierce, Allen & Clark, 2007). Reported as a percentage, an HbA1c reading below 7% is the recommended target for the vast majority of individuals with diabetes to reduce the risk of microvascular and macrovascular complications (Canadian Diabetes Association, 2013). Importantly, a 1% decrease in HbA1c levels is associated

with a 25% increase in health benefits (National Institute of Diabetes and Digestive and Kidney Diseases, 2006). Therefore, even small HbA1c reductions indicate a clinically meaningful positive health outcome.

We measured blood pressure using a portable, digitalized blood-pressure cuff. Blood pressure is reported as mean arterial pressure (MAP), which is a convenient way to assess blood pressure function using both systolic and diastolic measures (Schillaci, Pirro, & Mannarino, 2009). MAP is normally calculated as:  $(\text{systolic blood pressure} - \text{diastolic blood pressure})/3 + \text{diastolic blood pressure}$  (Meaney, et al., 2000). Average healthy blood pressure of 120/80 mmHg corresponds to a MAP of 93 mmHg. Systolic and diastolic measures are also reported. Hypertension is a common concern among people with diabetes and many of the health risks related to diabetes can be reduced with blood pressure management, particularly with better management of systolic blood pressure (Adler et al., 2000; Campbell et al., 2009). A more conservative target blood pressure of 130/80 mmHg is recommended for diabetes patients to reduce these risks (Canadian Diabetes Association, 2013).

We measured weight using a generic digital scale. Weight loss in diabetes patients is reported to improve glycemic control (Markovic, Jenkins, & Campbell, 1998). Even modest weight loss of up to 10% of body weight in obese patients has been associated with reduced blood pressure, improved glycemic control, reduced cholesterol, and increased longevity (Goldstein, 1992). Greater weight loss is associated with even greater health improvements (Anderson, Kendall, & Jenkins, 2003).

**Subjective health measures.** The Short Form Health Questionnaire measured health-related quality of life (SF-36; Ware, Snow, Kosinski, & Gandek, 1993). This 36-

item questionnaire provides eight scale scores: physical functioning, role limitations caused by physical health problems, general health, bodily pain, emotional well-being, role limitations caused by emotional problems, vitality (energy and fatigue), and social functioning. The SF-36 is recognized as a reliable tool for assessing health-related quality of life with reliability coefficients for the eight scales ranging from .83 to .93 (Gandek, Sinclair, Kosinski, & Ware, 2004) and test-retest correlations between .60 and .83 (Brazier et al., 1992). Brazier and colleagues (1992) have also reported substantial support for construct validity of the instrument. Response options range from yes/no dichotomies to 6-point rating scales with higher scores corresponding to better subjective health. Internal consistency reliabilities (Cronbach's alpha) for our sample ranged from a low of .60 on the social functioning scale to a high of .89 on the physical functioning scale (mean = .77).

We used the 21-item Depression, Anxiety, Stress Scales (DASS-21; Lovibond & Lovibond, 1995) to measure psychological distress. The DASS-21 provides an overall distress score as well as separate scores for depression, anxiety and stress subscales. Items are rated on a 4-point (0-3) scale with higher ratings indicating more negative symptom endorsement. The instrument is highly reliable with Cronbach's alphas ranging from .82 for depression to .93 for the overall scale (Henry & Crawford, 2005). Internal consistency reliabilities for our sample were good to excellent, ranging from .78 for the stress scale to .92 for the total scale. Henry and Crawford (2005) report good convergent and discriminant validity on this measure (compared with other validated measures of depression and anxiety). We chose this measure for its brevity and its good psychometric properties, but the main advantage the DASS-21 has over similar self-report measures is

that it provides an overall measure of psychological distress as well as separate scores for anxiety, stress, and depression--and it does so with a minimal number of questions.

To balance the emphasis on negative health outcomes we measured positive improvements with the Satisfaction With Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985). This measure consists of five questions related to subjective well-being, which are scored on a 7-point rating scale with higher scores indicating greater well-being. The SWLS has good internal reliability ( $\alpha = .87$ ) and temporal stability ( $r = .82$ ) over two months. Internal consistency for our sample was .92 (Diener, Emmons, Larsen, & Griffin, 1985).

**Diabetes self-care.** The revised Summary of Diabetes Self-Care Activities Questionnaire (SDSCA; Toobert, Hampson, & Glasgow, 2000) assessed self-care behaviours. The SDSCA measures five diabetes self-care regimen areas: Diet, exercise, blood-glucose testing, foot care, and smoking status. The measure provides five separate scale scores for these areas with most items requiring a report of the number of days per week respondents engaged in a certain activity (except smoking which requires a yes/no response and, if yes, the number of cigarettes smoked per day). The SDSCA is reported as the most widely used instrument measuring diabetes self-management behaviours in adults (Toobert, Hampson, & Glasgow, 2000). Although the specific psychometric properties of the new, revised version of the instrument are not available, the 11-item questionnaire is reported by the test developers to be a valid and reliable measure suitable for both practice and research (Toobert, Hampson, & Glasgow, 2000). Reliabilities for our sample were moderate to excellent for all scales, with Cronbach's alphas ranging from .71 for foot care to .99 for general diet.

**Mindfulness.** We assessed mindfulness using the 39-item Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). The five aspects of mindfulness measured by the factor analytically derived FFMQ are: observation (directly observing stimuli present in moment-to-moment experience), description (labeling body sensations or cognitions with words), acting with awareness (focusing awareness on current activities), non-judgment of internal experience (reserving evaluation of thoughts and feelings), and non-reaction to internal experience (noticing thought and feelings without reacting to them). Each item of the FFMQ is scored on a 5-point rating scale (1-5) with higher scores representing greater endorsement of the factor quality. The FFMQ has good construct validity and moderate to excellent internal consistency for each facet (alphas ranging from .72 to .92; Baer et al, 2008). Internal consistencies for our facet scores and the total score ranged from .66 to .88.

**Social validity.** We assessed the social validity of the program using the Client Satisfaction Questionnaire (Attkisson & Zwick, 1982), an 8-item self-report instrument that utilizes a 4-point rating scale where higher scores indicate greater satisfaction. The measure is reliable (internal consistency, coefficient alpha = .91) and valid as evidenced by its correlations with treatment adherence ( $r = .61$ ) and with change in client-reported symptoms ( $r = -.35$ ) (Attkisson & Zwick, 1982). Internal consistency for our sample was .94. We used an additional brief, primarily qualitative follow-up questionnaire (Santorelli & Kabat-Zinn, 2009) to assess the perceived lasting value of the program and to query any noticeable changes as well as the participants' opinions about, and use of, the practices. The questionnaire consisted of 9 items ranging from dichotomous yes/no



questions and checklists to indicate preferred practices and perceived changes (e.g., querying perceived lasting value and whether they continued to use the practices) to open ended questions (e.g., list any other changes noticed since taking the program). In addition, but not reported here, we conducted a qualitative interview to garner further information about the subjective experiences of the participants and to more fully assess the social validity of the program.

**Additional measures.** We asked participants to log their time spent in both formal and informal practices to determine whether the amount of time spent in practice corresponded with health changes (as reported in Carmody & Baer, 2007). We distributed logs at the end of each session and asked participants to bring the completed logs to the next session. However, as a result of inconsistent compliance, we abandoned these logs and instead asked participants to retrospectively report their average time spent in practice at the post-intervention assessment.

In addition, at the start of the study, we used the Holmes-Rahe Social Readjustment Rating Scale (SRRS; Holmes & Rahe, 1967) as a general index of life stress to quantify the levels of stress in our sample. The SRRS measures life stress by assessing whether 43 stressful life events occurred in the previous year. Items are assigned quantitative values according to the amount of stress they typically generate. Values range from 11 (minor violation of the law) to 100 (death of a spouse) and the values for the identified events are summed to obtain the overall score. Scores over 300 indicate a substantial risk of stress-related illness, scores under 150 indicate a slight risk of illness, and scores of 151 to 299 indicate a moderate risk.

## Data Analysis

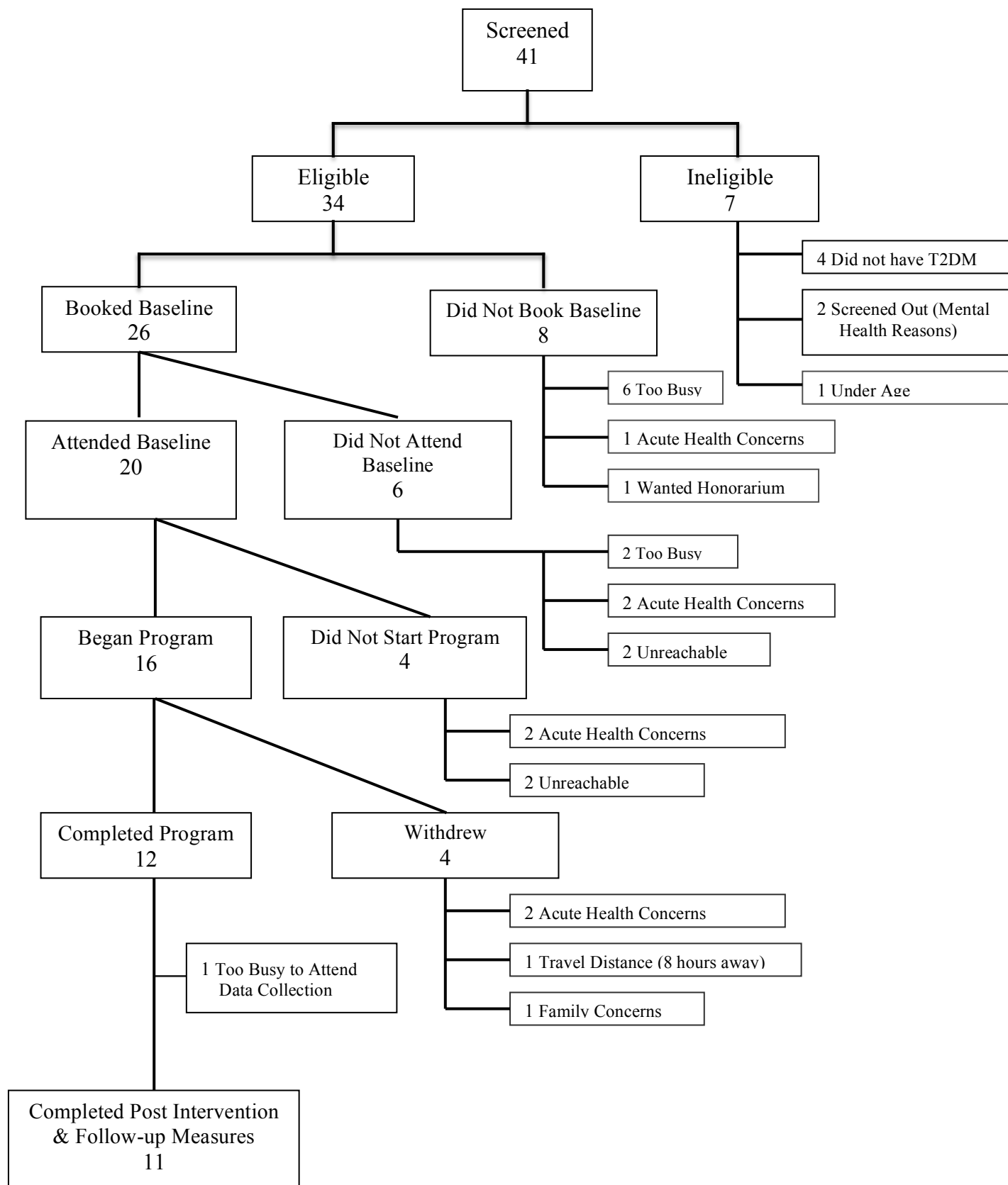
To test the main hypothesis that the completion of a mindfulness-based intervention would lead to significant health improvements, we analyzed HbA1c levels, MAP, and self-report data (physical and emotional health, diabetes self-care behaviours, and mindfulness) using a repeated measures analyses of variance with 3 assessment times. We then conducted follow-up paired comparisons and calculated effect sizes. We report, and emphasize, effect sizes since they are less affected by sample size than significance test results ( $p$  values), which are known to increase type 2 error in small samples and can lead researchers to miss important relationships (Hoyle, 1999). We calculated the overall effect size as  $\eta_p^2$ , for which .01 is considered a small effect (i.e., 1% of the variance is explained by the independent variable), .06 a medium effect, and .14 a large effect. In addition, we report effect sizes for baseline to post-intervention and baseline to follow-up comparisons as Cohen's  $d$  values where effect-sizes of .20, .50, and .80 represent small, medium, and large effects, respectively (Cohen, 1992).

While analysis of covariance (ANCOVA) is an efficient way of controlling for potential confounds, we did not have enough statistical power to include covariates in our models. Instead, we examined associations between change scores on our dependent measures and potential confounds using correlational analyses for continuous measures and one-way ANOVA's for categorical variables. Potential confounds included sociodemographic variables (age, aboriginal status, length of diabetes, education level, family income, and residential community), baseline stress (SRRS), baseline weight, treatment changes, program group (first, second, or third), number of sessions attended, and time spent in practice.

## Results

As shown in Figure 1, of the 41 people screened for the study, 26 were eligible and interested in booking a baseline assessment appointment, 16 attended the first session, and 11 completed the intervention and follow-up assessments. Those who withdrew from the study primarily cited acute health concerns and lack of time as the reasons for discontinuing.

As described in Table 2, the majority of participants were female (91%) with a mean age of 60 years, were not married (64%), had a low annual income (55%), and had obtained a formal education below post-secondary (64%). Duration of diabetes ranged from newly diagnosed (6 months) to long term (39 years) and participants were fairly equally distributed in terms of employment status, between those identifying as First Nations and Metis, and between those living in urban and rural settings. Participants attended an average of seven of the eight sessions and reported engaging in home practice four days per week, 20 minutes per day. Over the course of the study, four participants reported diabetes medication changes and five reported receipt of diabetes education in the areas of diet recommendations, regular exercise, weight reduction, blood sugar testing, and foot care recommendations.



**Figure 1.** Flow diagram of participant enrolment and attrition.

**Table 2.***Sample characteristics*

Gender (%)	
Female	10 (90.9)
Male	1 (9.1)
Age (mean years $\pm$ SD)	60.1 $\pm$ 8.7
Aboriginal Status, self identified (%)	
First Nations	6 (54.5)
Metis	5 (45.5)
Residence Location (%)	
Urban	6 (54.5)
Reservation	3 (27.3)
Rural, Non-reservation	2 (18.2)
Length of Diabetes (mean years $\pm$ SD)	10.4 $\pm$ 12.2
Marital Status (%)	
Married	4 (36.4)
Not-married	7 (63.6)
Education (%)	
Below Grade 12	4 (36.4)
Grade 12	3 (27.2)
Post-Secondary	4 (36.4)
Employment Status (%)	
Employed	5 (45.5)
Not-employed	6 (54.5)
Annual Income (%)	
Low (below 25k)	6 (54.5)
Middle (25k-49k)	4 (36.4)
High (above 50k)	1 (9.1)
Sessions Attended (mean $\pm$ SD)	6.82 $\pm$ .98
Time Practiced (mean $\pm$ SD)	
Days per week	4.05 $\pm$ 1.46
Minutes per day	21.8 $\pm$ 15.07
Treatment changes	
Diabetes medication (%)	
Post-intervention	3 (27)
Follow-up	1 (9)
Diabetes education (%)	
Post-intervention	4 (36)
Follow-up	1 (9)
Baseline Stress Level, SRRS* (mean $\pm$ SD)	149.0 $\pm$ 87.97

\* SRRS = Social Readjustment Rating Scale where scores > 300 = substantial risk of stress-related illness, 151 to 299 = moderate risk, and <150 = slight risk.

At baseline, participants were, on average, at slight risk of stress-related health concerns (SRRS = 149) but the scores ranged from very low risk (SRRS = 39) to high risk (SRRS = 320). Blood sugar was, on average, above the recommended HbA1c value of 7% ( $7.19 \pm 1.4$ ) and MAP was higher than the recommended average (102.5 vs. 93). Systolic measures were particularly high at 147 mmHg (SD = 15) whereas diastolic measures were closer to the recommended value of 80 mmHg. On measures of psychological distress, participants were, on average, in the normal range for stress and depression, but in the moderate range for anxiety. Satisfaction with life was in the average range overall, indicating participants were generally satisfied with their lives, but individual scores ranged from dissatisfied to highly satisfied.

As predicted, and as shown in Table 3, we found a significant improvement in HbA1c levels across the three measurement periods,  $F(2,10) = 4.062, p = .03, \eta_p^2 = .289$ . Pairwise comparisons indicate that the reduction in HbA1c of .43% from baseline to post-intervention was significant ( $p = .02$ ) whereas the reduction from baseline to follow-up of .36% only approached significance ( $p = .08$ ). Individual effect sizes for these comparisons were small to medium. It is important to note that several participants ( $n = 5$ ) demonstrated good control (HbA1c < 7) of their blood sugar prior to the start of the program. Of those participants whose HbA1c levels at baseline were above the typical recommended range of 7% ( $n = 6$ ), post intervention and follow-up measures were more clearly indicative of a significant and clinically important reduction in blood sugar,  $F(2,10) = 16.51, p = .001, \eta_p^2 = .768$ . In this subset of participants, the mean baseline HbA1c level was 8.22 (SD = .91), post-intervention HbA1c was 7.52 (SD = 1.27), and follow-up HbA1c was 7.45 (SD = .95). Pairwise comparisons revealed that reductions

**Table 3.**

Means, standard deviations, and effect sizes for all outcome measures over time ( $N = 11$ ).

	T1 Mean (SD)	T2 Mean (SD)	T3 Mean (SD)	T1-T2 Effect-size <sup>‡</sup>	T1-T3 Effect-size <sup>‡</sup>
HbA1C*	7.19 (1.36)	6.76 <sub>a</sub> (1.27)	6.83 (1.01)	.37	.30
Uncontrolled subset** ( $n = 6$ )	8.22 (.91)	7.52 <sub>a</sub> (1.27)	7.45 <sub>a</sub> (.95)	.63	.83
MAP*	102.52 (10.33)	94.61 <sub>a</sub> (8.12)	96.39 <sub>a</sub> (9.72)	.85	.61
Systolic*	147.36 (14.86)	131.27 <sub>a</sub> (13.16)	136.45 <sub>a</sub> (16.59)	1.15	.69
Diastolic	80.09 (11.25)	76.54 (9.75)	76.36 (7.67)	.34	.39
Weight (kg)	84.22 (12.69)	84.59 (12.83)	83.95 (12.78)	.03	.02
DASS (total)	29.82 (22.98)	22.18 (24.19)	23.64 (20.45)	.32	.28
Depression	9.63 (10.83)	7.09 (9.57)	5.45 (6.52)	.25	.47
Anxiety	10.00 (8.25)	6.55 (7.16)	8.54 (7.70)	.45	.18
Stress	10.00 (8.05)	8.55 (8.72)	9.45 (7.75)	.17	.07
SF36 General health*	56.36 (22.26)	64.10 <sub>a</sub> (16.56)	63.63 <sub>a</sub> (19.63)	.39	.35
Physical functioning	64.55 (26.50)	75.91 (24.58)	78.63 <sub>a</sub> (21.22)	.44	.59
Role physical	65.91 (35.83)	63.64 (37.69)	65.91 (42.24)	.06	.00
Emotional well-being**	62.55 (21.71)	78.54 <sub>a</sub> (20.72)	77.10 <sub>a</sub> (19.44)	.75	.71
Role emotional	63.64 (45.84)	81.82 (31.14)	69.70 <sub>b</sub> (45.84)	.46	.13
Vitality	61.82 (24.32)	55.27 (18.24)	65.45 <sub>b</sub> (20.79)	.30	.16
Social	60.23 (33.92)	78.41 (23.78)	61.36 (31.35)	.62	.03
Pain	68.64 (23.14)	67.05 (21.35)	64.55 (21.12)	.18	.07
SWLS	23.14 (7.76)	23.64 (7.38)	23.18 (7.16)	.07	.01
FFMQ (total)	3.43 (.40)	3.36 (.40)	3.51 <sub>b</sub> (.43)	.18	.19
Observe	3.17 (.62)	3.34 (.68)	3.50 <sub>a</sub> (.52)	.26	.58
Describe	3.36 (.82)	3.24 (.74)	3.38 (.71)	.15	.03
Act w/awareness	3.52 (.62)	3.50 (.65)	3.60 (.54)	.03	.14
Non-judgment	3.94 (.60)	3.78 (.47)	3.93 (.47)	.30	.02
Non-reaction	3.09 (.56)	2.92 (.73)	2.97 (.55)	.26	.22
SDSCA-Diet general	4.50 (2.69)	5.30 (1.25)	4.60 (1.85)	.38	.04
Diet-fruit & veg	4.20 (2.35)	4.10 (1.79)	4.30 (2.06)	.05	.05
Diet- low fat	3.90 (1.66)	4.50 (1.51)	4.30 (1.89)	.38	.22
Exercise	3.10 (2.54)	2.90 (2.08)	2.90 (1.94)	.09	.09
Glucose testing	3.25 (2.85)	3.60 (2.99)	3.75 (2.21)	.12	.20
Checking feet	3.45 (2.44)	3.40 (2.98)	3.40 (2.63)	.02	.02
#cigarettes/day	4.60 (8.26)	4.20 (8.66)	4.00 (8.34)	.05	.07

T1 = baseline, T2 = post-intervention, T3 = follow-up; ‡ Cohen's  $d$ ; \*  $p < .05$ ; \*\* $p < .01$ ;  
a = significant change from baseline; b = significant change from post-intervention. HbA1c = glycated hemoglobin,  
MAP = mean arterial pressure, DASS = Depression, Anxiety, Stress Scales, SWLS = Satisfaction with Life Scale,  
FFMQ = Five Facet Mindfulness Questionnaire, SDSCA = Summary of Diabetes Self-Care Activities;  
higher numbers indicate higher functioning on the SF36, SWLS, FFMQ, and SDSCA.

from baseline in this subsample were significant and associated with medium to large effect sizes at both the post-intervention ( $p < .01$ ;  $d = .63$ ) and follow-up ( $p = < .001$ ;  $d = .83$ ) assessments. An analysis of potential confounds indicated that lower life stress at baseline was associated with significantly greater reductions in HbA1c at post-intervention ( $r = .60, p = .05$ ). In addition, changes were significantly greater for participants living off-reservation than for those living on-reservation both at post-intervention ( $F(1,10) = 8.12; p = .02$ ) and at follow-up ( $F(1,10) = 8.28; p = .02$ ). We found no other associations with potential confounds.

Also as predicted, change in mean arterial pressure (MAP) over time was significant;  $F(2,10) = 4.35, p = .03; \eta_p^2 = .303$ . Paired comparisons revealed a significant reduction in MAP from baseline to both post-intervention and follow-up, with large and medium to large effect sizes, respectively. We found a significant reduction in systolic blood pressure from baseline at both post-intervention and follow-up time points as well. These reductions also were associated with medium to large effect sizes. Changes in diastolic blood pressure were not significant but reductions from baseline were associated with small to medium effect sizes at post-intervention and follow-up. We found no significant associations with potential confounding variables.

We found no significant change in weight over time;  $F(2,10) = .70, p = .51; \eta_p^2 = .066$ . Paired comparisons revealed no meaningful change in weight from baseline and we found no significant associations with potential confounding variables.

Also consistent with our hypothesis were positive changes in several self-report measures of physical and emotional health. For the SF-36, we found significant improvements over time on the general health scale [ $F(2,10) = 3.75, p = .04, \eta_p^2 = .273$ ]



and the emotional well-being scale [ $F(2,10) = 5.54, p = .01, \eta_p^2 = .356$ ]. Pairwise comparisons revealed significant baseline to post-intervention improvements in general health and emotional health that remained significant when measuring from baseline to follow-up. Effect sizes were small to medium for general health and medium to large for emotional health. Paired comparisons revealed an additional significant improvement from baseline to follow-up on the physical functioning scale and this was associated with a medium effect size. Although no other improvements from baseline on the SF-36 were statistically significant, we found medium effect sizes from baseline to post-intervention for improvements in social functioning and role limitations due to emotional functioning. Neither of these changes remained at follow-up and the rebound back toward baseline levels for role limitations due to emotional functioning from post-intervention to follow-up was significant. We also found a small to medium effect for a decrease in vitality from baseline to post-intervention but the improvement in vitality from post-intervention to follow-up was statistically significant and compensated for this reduction. Analyses of potential confounds revealed an association between length of diabetes and changes in emotional functioning, with more positive change in emotional functioning experienced by participants with a longer duration of diabetes, both at post-intervention ( $r = .71, p = .01$ ) and at follow-up ( $r = .63, p = .04$ ).

Changes in general psychological distress on the DASS-21 were not statistically significant but reductions from baseline on the total scale were associated with small to medium effect sizes at post-intervention and follow-up. Reductions from baseline on the anxiety and depression subscales also were associated with small to medium effect sizes at post-intervention and follow-up. These findings indicate a positive change in general

psychological distress that likely would have been statistically significant with a larger sample. Similar to the results for emotional health related quality of life on the SF-36, analysis of potential confounds revealed an association between length of diabetes and the DASS total scale, with a larger decrease in symptoms experienced by participants with a longer duration of diabetes. We found this association for changes from baseline both at post-intervention ( $r = .80, p = .003$ ) and at follow-up ( $r = .71, p = .02$ ).

We found no statistically significant changes on self-report measures of diabetes self-care behaviours (SDSCA) or general life satisfaction (SWLS). Effect sizes were negligible with respect to the SWLS, whereas for the SDSCA we found small effect sizes with respect to improvements in daily glucose testing at follow-up, as well as small to medium effects sizes on scales measuring general diet (post-intervention) and avoiding high-fat foods (post-intervention and follow-up), which indicate some healthier dietary choices. We found no associations with potential confounds for the SDSCA or the SWLS.

With respect to the effect of our intervention on mindfulness, analysis of the FFMQ total scale showed no statistically significant change [ $F(2,10) = 2.18, p = .14$ ] despite a large overall effect size ( $\eta_p^2 = .18$ ). Paired comparisons revealed no significant changes on the total scale from baseline although we did find a significant increase from post-intervention to follow-up. We found an additional significant increase in the observe scale from baseline to follow-up with an associated medium effect size. We found no significant changes on scales of non-judging of inner experience and non-reactivity to inner experience but small to medium effect sizes indicated a baseline to post-intervention reduction in these qualities. At follow-up, these reductions rebounded

towards baseline levels for both scales although the non-reaction scale retained a small effect size from baseline. No associations with potential confounds were discovered on the total scale, but greater age was associated with higher scores on the observe scale at post-intervention ( $r = .82, p = .002$ ). In addition, the program attended was related to change on the observe scale at post-intervention ( $F(2, 10) = 7.41, p = .02$ ). These associations did not remain at follow-up.

Social validity measures indicated that, overall, the participants were very satisfied with the program and its outcome. On the Client Satisfaction Questionnaire, 10 of the 11 participants rated the program as Very Good to Excellent, with a mean score of 34.5 (SD = 5.1) out of a possible 40. All participants indicated that they would recommend the program to someone in need of similar help and the majority (10 of 11) indicated they would come back to the same program if they were to seek help again. On the brief follow-up questionnaire, 100% of participants reported that they got something of lasting value from taking the program. Positive change was reported by all respondents in the areas of self-care and the awareness and management of stressful situations. The majority (9 of 11) of participants also indicated increases in self-confidence, assertiveness, and the perceived ability to improve their own health. When asked to indicate, in their own words, if they noticed any other changes, participants reported less anger, increased general awareness, feeling calmer and more relaxed, prioritizing themselves more, and having more self-compassion. Equally indicative of the perceived value of the program was that 10 of the 11 participants continued to use both formal and informal practices beyond the cessation of the program. These participants also indicated an intention to continue using the practices.

## Discussion

The most significant findings from this feasibility study support the hypothesis that participation in a mindfulness intervention is associated with health improvements in Aboriginal people with T2DM. Participants experienced improved glycemic control as well as a reduction in blood pressure. Results are promising for subjective physical and emotional health improvements as well. In addition, the participants evaluated the program very positively, suggesting that it is a feasible intervention option for Aboriginal people.

Our clinically important findings are largely consistent with those of Rosenzweig and colleagues (2007), who found significant reductions in HbA1c with medium to large effect sizes in a similarly sized study with non-Aboriginal individuals with T2DM. The findings of these studies diverge in the timing of the changes, however; whereas we found overall significant changes (small to medium effect) immediately after the completion of the program, they discovered significant changes only at a one-month follow-up. Our follow-up data collection occurred two months after the completion of the program, which renders it difficult to directly compare the follow-up results. Given that HbA1c is a biological marker indicating average blood glucose over the past two to three months, it is possible that our post-intervention reduction in HbA1c would have remained significant at a one-month follow-up as Rosenzweig and colleagues found. An additional difference exists in our lack of inclusion criteria based on HbA1c levels. Rosenzweig et al. (2007) screened participants for HbA1c levels of 6.5% to 8.5% whereas we included participants who were well controlled for this measure (below 6.5%). In our subset of participants with HbA1c levels over the recommended 7% ( $n =$

6), improvements were medium to large and statistically significant from baseline at both post-intervention and follow-up and, therefore, more consistent with the findings of Rosenzweig and colleagues (2007). Considering a further reduction in HbA1c for those who already displayed glycemic control lacks substantial clinical importance, the results from this subset better indicate the potential for this intervention to improve health risks for Aboriginal patients with diabetes.

Also supportive of our findings, a recent RCT of MBSR for non-Aboriginal T2DM patients ( $N = 110$ ) examining HbA1c as a main outcome measure revealed a medium effect size ( $d = .47$ ) for MBSR group over controls at follow-up that approached significance ( $p = .09$ ; Hartmann, et al., 2012). Although another recent RCT (van Son et al., 2013) did not find significant differences in HbA1c following participation in MBCT, glycemic control was a secondary outcome that was measured somewhat unreliably (up to 24 weeks before and after intervention), making it difficult to directly compare their results to other studies looking at the effect of mindfulness interventions on glycemic control. Despite the lack of statistically significant differences in glycemic regulation both recent RCT studies reported a trend toward an increase in HbA1c for the control groups, indicating a possible preventative role for mindfulness interventions. Our findings combined with previous research support the ability of mindfulness interventions to help individuals with T2DM control their blood sugar, which is vitally important given the myriad of potential problems associated with elevated and uncontrolled blood sugar levels in patients with diabetes.

Our finding of an association between living off reservation and lower life stress at baseline and greater reductions in HbA1c post-intervention (also at follow-up for those

living off reservation), points to a potential limit to the benefits of mindfulness interventions in supporting glycemic control. It is possible that those living with higher levels of stress and in reservation communities may require further assistance with stress management to maximize health benefits.

A second important finding from our study is that participants experienced improvements in blood pressure. The significant and large decreases in blood pressure (MAP) we found at post-intervention and follow-up when compared to baseline are consistent with the findings of Rosenzweig et al. (2007). The Heidelberger Diabetes and Stress Study (Hartmann et al., 2012) did not report MAP but the researchers found a significant difference in diastolic blood pressure between MBSR and control groups at follow-up ( $p = .02$ ) and effect sizes were medium to large at post-intervention and at one-year follow-up (Cohen's  $d$ 's of .48 and .68, respectively). Unlike our results, the authors found no significant difference in systolic blood pressure, which may be due to the lower average baseline systolic measures in their participants (138.5 mmHg vs. 147.4 mmHg). Importantly, our significant reduction in systolic blood pressure represents a major improvement in the risk of diabetes-related health concerns. A reduction of 10 mmHg in systolic pressure is reportedly associated with a 12% reduction in risk for all diabetes related health complications (Adler et al., 2000), making our reductions of 16.1 mmHg (post-intervention) and 11 mmHg (follow-up) a major health benefit. While any regulation of blood pressure (recommended to be less than 130/80 for diabetes patients) is likely to reduce the risk associated with microvascular and macrovascular health complications in diabetes patients, diastolic measures appear to be less associated with these protective effects (Campbell et al., 2009). Further support for the positive effects of

mindfulness interventions on blood pressure exist outside of the context of diabetes (Campbell, Labelle, Bacon, Faris, & Carlson, 2012; Hughes et al., 2010).

Also consistent with Rosenzweig et al. (2007), we found no significant change in weight across data collection periods, so that weight-loss did not account for the positive health changes. Similarly, because changes in diet, exercise, or other self-care behaviours were non-significant and associated with small effect sizes it is unlikely that these factors could account for the health improvements we observed. Weight management and other self-care behaviours were not specifically targeted during our program and, as such, changes were not expected as a result of participation.

A third important finding from our study was the significant improvement in subjective health. Participants reported significant increases in health related quality of life in the areas of general health and emotional well-being. These improvements were present at post-intervention and were maintained at follow-up. While not significant, we also found small to medium effects for improvements in general psychological distress as well as for depression and anxiety. Our effect sizes from the DASS-21 are generally consistent with effect sizes for emotional health improvements reported by other mindfulness and diabetes research groups (Hartmann et al., 2012; Rosenzweig et al., 2007; van Son et al., 2013) and by several meta-analyses that indicate, on average, medium effect sizes for emotional health measures following mindfulness-based programs (Baer, 2003; Eberth & Sedlmeier, 2012; Grossman, Niemann, Schmidt, & Walach, 2004; Hofmann, Sawyer, Witt, & Oh, 2010). The association between a longer duration of diabetes and improved emotional functioning at both post-intervention and follow-up time points seems to indicate that the intervention may be especially helpful for

those who have been managing diabetes for several years. Age was not associated with greater glycemic control. Therefore, it appears that there is a more direct relationship with length of diabetes and improved blood sugar management following the intervention.

Rosenzweig et al. (2007) hypothesized that modulation of the physiological stress-response may be responsible for improved glycemic regulation following mindfulness training. They explain that a heightened stress response is associated with an increase in stress-related hormones and neurotransmitters that increase blood glucose and insulin resistance, and that participation in mindfulness-based interventions leads to improved glycemic control through a decrease in reactivity to stress triggers and the subsequent lowered physiological stress-response. Despite limited statistically significant changes on our emotional health measures, effect sizes for these measures suggest that this hypothesized association is plausible.

More conventional psychological interventions (e.g., cognitive behaviour therapy or psychodynamic therapy) in diabetes patients show mixed results for glycemic control. One review indicates positive results (Ismail, Winkley, & Rabe-Hesketh, 2004) while another review, limited to treatments for depression, found no effect (Wang, Tsai, Chou, & Chen, 2008). Perhaps mindfulness interventions are a superior approach since they more specifically target stress-reactivity and can exert an effect on stress hormones that directly affect blood sugar levels (Peyrot, McMurray, & Kruger, 1999). Mindfulness interventions may be particularly suited to indigenous populations due to their emphasis on a mind-body approach, but also because of the importance placed on sharing, equality, introspection, and taking lessons from daily living (Gone, 2009; McCabe, 2007).



We also found a medium effect size for improvements in physical functioning indicating that participants' perceptions of their physical health also improved over time. We discovered an improvement in role limitations due to emotional functioning at post-intervention (medium effect size) but this effect was lost at follow-up, indicating a possible time limited effect for this variable. While we found a reduction in vitality at post-intervention (small to medium effect), a significant increase from post-intervention to follow-up indicated that this effect was also time limited. The net result from baseline to follow-up for both of these variables was minimal, indicating no overall, long-term change following participation in the program. The effects seen on both of these variables at post-intervention may simply be the result of program attendance (not program content).

We found no change on a measure of life satisfaction. While this was an unexpected result, participants reported being generally satisfied with their lives at baseline, making potential improvements on this scale less important as an indicator of enhanced well-being. This is the case for many of the self-report measures. Overall, participants indicated at baseline that they were not highly stressed (SRRS), were primarily in the normal range on a measure of psychological distress (DASS), and indicated minimal difficulties in terms of quality of life (SF36). While there was considerable variability on each of these measures, on average the scores were in the healthy and well functioning range, which helps account for the lack of significance in our results.

Despite our general lack of statistically significant improvements in mindfulness, small to medium effect sizes for change on this measure over time suggests improvement

on the total scale and in qualities related to directly observing moment-to-moment experience. Significant increases in the observe scale from baseline to follow-up and in the total scale from post-intervention to follow-up may be the result of continued practice (reported by the majority of participants), suggesting that these improvements develop over time. The association we found between greater age and increases on the observe scale at post-intervention was interesting but the lack of maintenance of this relationship at follow-up limits the interpretation of the association. A similar pattern was found with the association between program group and increases on the observe scale at post-intervention; a loss of this association at follow-up limits its meaning.

With our small sample, we were not able to adequately explore the relationship between aspects of mindfulness and changes in health variables, but a connection seems possible and would be interesting to explore in a larger, better controlled study. While the standardized mindfulness questionnaire we adopted did not clearly indicate an increase in mindfulness, many participants indicated, in their own words on the qualitative follow-up questionnaire, that they experienced increases in acceptance and awareness (of self, others, and the environment) and decreases in emotional reactivity and self-judgment. Given these positive subjective accounts, it is possible that the standardized mindfulness questionnaire did not tap into these concepts in a way that was accessible to the participants and, therefore, is not a direct reflection of the change in their embodiment of mindfulness. In fact, none of the self-report questionnaires used in our study appear to have been normed in indigenous populations and, therefore, may not provide valid measures of the intended constructs within this cultural group due to the potential for different subjective interpretations of test items (Mallinson, 2002).

Changes in diabetes self-care behaviors were not significant and effect sizes were generally trivial. However, we found small effects for increases in blood sugar testing, reductions in the consumption of high-fat foods, and positive changes to dietary choices in general. These results are largely consistent with the findings of Rosenzweig et al. (2007) but not with the findings of Gregg, Callaghan, Hayes, & Glenn-Lawson (2007) who reported a significant increase in diabetes self-care behaviours at 3-month follow-up (with a moderate to large effect size). The difference is likely best explained by the primary emphasis Gregg and colleagues (2007) placed on self-care behaviours while teaching mindfulness during their one-day diabetes education workshop. During our intervention, diabetes self-care behaviours were not directly targeted and any changes that did occur likely had multiple, indirect causes.

The suitability and acceptability of the program for an Aboriginal population is supported by subjective ratings indicating that participants valued what they learned, were satisfied with the outcome, would recommend it to others in their community, and continued with the practices beyond the end of the program. Indirect evidence for the acceptability of the program can be found in the rate of attrition. With four people discontinuing (see Figure 1), the attrition rate for our program was 25%. While our attrition rate is somewhat higher than the average reported rate of attrition for mindfulness-based interventions in general (15%; Vibe, Hammerstrøm, Kowalski, & Bjørndal, 2010), it is lower than the reported attrition rate for mindfulness interventions with primarily minority populations in inner-city environments (34-40%; Roth & Creaser, 1997 and Roth & Robbins, 2004), which is a more appropriate comparison for our sample. More specifically, our attrition rate was comparable to the attrition rates

from two recent RCT's investigating mindfulness interventions for diabetes, 17% (Hartmann et al., 2012) and 26% (van Son, 2013), suggesting that, with appropriate modifications, a mindfulness-based program seems similarly acceptable for Aboriginal people as for other populations with diabetes.

While our study shows clear positive health changes associated with clinically meaningful effect sizes, there are several limitations that warrant caution in the interpretation of the results. First and foremost, the small sample size and lack of a control group limit the reliability and generalizability of the results. Sample size lowered the reliability of our pairwise comparisons and limited our ability to control for potential confounds. Sample size similarly restricted our ability to explore potential mediating variables. As mentioned previously, no normative data appears to exist in an Aboriginal population for the self-report measures we used. Cultural, language, and educational differences may have affected the validity and reliability of the measures. As with any self-report measures, the potential for bias in reporting also exists. Because our sample was restricted to a small geographical region, our results may not generalize to other regions or to other indigenous populations and our self-selecting sample may have been more motivated and less distressed than average. In addition, unlike the study by Rosenzweig and associates (2007), participants' data were not discarded due to diabetes medication changes during the time of the study. In support of our results, however, we found no statistical association between medication changes and health improvements. We did not monitor for other diagnoses or the use of other types of medication and these may have played a role in some of the observed health improvements as well. Furthermore, our use of a generic, electronic blood pressure cuff at single time-points is

not the most reliable measure of blood pressure. Ambulatory, 24-hour BP monitoring would have provided a more valid and reliable measure for analysis (van Son, Nyklicek, Pop, & Pouwer, 2011).

In conclusion, our results support the use of mindfulness-based interventions as an acceptable alternative for some indigenous people, and suggest that participation can lead to clinically important health changes. This is promising given the health disparities faced by indigenous communities worldwide, particularly in the case of diabetes. With larger, more diverse indigenous population samples and tighter experimental control (including randomized controlled trials), we will be in a position to better understand the potential benefits of mindfulness interventions for this population. Future studies also could build on this preliminary project by including additional potential confounds such as other medical conditions (particularly the important and oft accompanying condition of hypertension) and monitoring all medication use throughout the program. Limiting inclusion to those with uncontrolled blood sugar, as done by Rosenzweig et al. (2007), would assist with understanding the effects of the intervention on glycemic control. Adding a biological marker of stress such as cortisol would compliment the self-report measures of stress and strengthen the exploration of the relationship between stress reduction and glycemic control in diabetes patients. In addition, mediation analyses in a larger sample would help elucidate the relationships among stress reduction, self-care behaviours, and health outcomes and assist with investigating the biopsychosocial model of glycemic control proposed by Peyrot, McMurray, and Kruger (1999). To ensure sufficient recruitment for such a study, it would be helpful for researchers to have a well-established connection with the indigenous community they are working with. Trust,

understandably, is a crucial factor when working with indigenous populations and time spent building relationships prior to recruitment efforts would be highly beneficial. It also would be helpful to include community members and potential participants in the study design and implementation and to discuss data ownership and access, including access to results, prior to the investigation (e.g., using the guidelines set out in First Nations Centre, 2007).

With additional support for the effectiveness of mindfulness as a treatment and/or preventative measure for diabetes and associated physical or emotional health concerns (as suggested by Heidelberg, 2012), this intervention has the potential to reduce the health disparity for this historically underserved population. Having a useful, accessible, and cost-effective program that is suitable to indigenous people could assist with restoring the health and well-being of this disadvantaged population and improve the lives of many people world-wide.

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## CHAPTER THREE

Acceptability and Suitability of Mindfulness Training for Diabetes Management in an  
Indigenous Community<sup>2</sup>

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### **Abstract**

The incidence of type 2 diabetes mellitus (T2DM) has been categorized as a worldwide epidemic and indigenous populations experience disproportionately higher rates. Stress is a factor in both the development and maintenance of T2DM and stress is common in the lives of indigenous people. Previous research indicates that mindfulness-based interventions (MBI) can improve health outcomes for diabetes patients and we hypothesized that the mind/body approach of MBIs would be appropriate for, and acceptable to, indigenous people whose healing traditions incorporate aspects of mind, body, and spirit. As part of a mixed-methods feasibility study, our previous quantitative investigation revealed both statistically and clinically significant health improvements in Aboriginal participants (N = 11) recruited from urban and rural centres in Manitoba, Canada. In this qualitative study, we set out to determine the acceptability, suitability, and perceived value of the MBI through the reported subjective experiences of these participants. Data obtained through semi-structured interviews were analyzed using the framework analytic approach and revealed several salient categories and subcategories under the main themes of: Factors related to participation, including motivating factors and barriers; outcome, including perceived benefits and evaluations of the program and its practices; and directions for future programs. Overall, the results indicate that the Aboriginal participants valued the lessons, practices, and perceived benefits of the program and they found the MBI culturally acceptable and suitable to their needs.

## Introduction

The incidence of type 2 diabetes mellitus (T2DM) has been steadily increasing worldwide, resulting in its categorization as an epidemic (Young, Reading, Elias, & O'Neil, 2000) and rates are disproportionately higher for indigenous populations and other ethnic minorities (Rock, 2003). In the Canadian Aboriginal population, diabetes rates are reportedly 3.6 to 5.3 times higher than those in the non-Aboriginal Canadian average (Statistics Canada, 1993) and this disparity appears to be growing (Frohlich, Ross, and Richmond, 2006). A major factor influencing the higher prevalence of diabetes in the Canadian Aboriginal population appears to be stress, which is prominent in the lives of Aboriginal people worldwide and seems to be the result of displacement, cultural repression, and marginalization following colonization (Rock, 2003). The high levels of stress and subsequent effects on physical and emotional health in Aboriginal communities appear to be due to a number of economic and social challenges such as poverty and disempowerment associated with the move towards colonization and Westernization of Aboriginal people (Rock, 2003). Stress is understood to play an important role in the onset and management of diabetes by both conventional medical science (Lloyd, Smith, & Weinger, 2005) and traditional Aboriginal conceptualizations of the disease (Giles, et al., 2007).

Previous research suggests that stress management is a crucial factor in the successful treatment of diabetes (Iwasaki, Bartlett, & O'Neil, 2005; Lammers, Naliboff, & Straatmeyer, 1984). Mindfulness-based interventions (MBI) such as Mindfulness Based Stress Reduction (MBSR) developed by Jon Kabat-Zinn (1990) are one way to address this need. Cognitive Behavioural Therapy (CBT) is another treatment known for

its stress management effects but MBIs can more easily accommodate varying world-views, which appears to make them more suitable for an Aboriginal population than CBT techniques that tend toward supporting individualistic values (Roemer & Orsillo, 2009). Additionally, standard CBT does not emphasize body awareness and body movement, which are central to mindfulness interventions and are beneficial in the treatment of physical health conditions (Salmon, et al., 2009), and are particularly important when treating diabetes (Tudor-Locke et al., 2004).

During MBIs, participants learn a number of practices that serve to increase their capacity for mindfulness. Kabat-Zinn (2003) defines mindfulness as a moment-to-moment, non-judgmental awareness and acceptance of thoughts, feelings, and bodily sensations. Other descriptions also emphasize an attitude of compassion or affectionate curiosity in the practice of mindfulness (Vallejo & Amaro, 2007). Becoming more aware, open to, and accepting of body sensations, thoughts, and emotions is proposed to ameliorate stress by facilitating the detection of early indicators of stress, ruminative thought, and physiological arousal, allowing individuals to respond to these cues with more effective coping strategies (Salmon et al., 2004).

The structure and format of different MBIs vary, but participants in MBSR programs learn mindfulness through a series of group sessions, usually in 8 weekly, 2 ½ hour sessions that include instruction in a variety of meditative practices. Experiential learning through guided practices in group sessions and daily practice at home is purported to be the key to mastering mindfulness (Kabat-Zinn, 2003). Group discussions focused on exploring participants' experiences with the practices enhance this learning.

MBIs are quickly emerging as effective complementary treatment alternatives for

many health conditions, particularly those known to be exacerbated by stress (Baer, 2003; Greeson, 2008; Grossman, Niemann, Schmidt, & Walach, 2004; Shigaki, Glass, & Schopp, 2006). Preliminary evidence indicates that MBIs are effective for diabetes patients as well. Reported outcomes include improved glycemic control (Rosenzweig et al., 2007), reduced blood pressure (Hartmann, et al., 2012), and improved psychological well-being (Keyworth, et al., 2013; Miller, Kristeller, Headings, & Nagaraja, 2013; van Son, et al., 2013).

Prior to our research, there appeared to be no published studies examining the effectiveness of mindfulness interventions in indigenous populations. Through involvement in traditional Aboriginal ceremonies and conversations with Aboriginal leaders, we came to understand that the principles and practices of mindfulness are consistent with or, at a minimum, complementary to Aboriginal traditions that encourage taking lessons from all aspects of life. For example, the Aboriginal tradition of fasting on the land is a practice that allows individuals to connect with themselves and to the world around them, through an open, non-judging, and accepting attitude of all internal and external experiences. Further points of convergence between the two traditions include emphases on equality, the importance of community, compassion for others, and healing through sharing and understanding. Others have reported the compatibility of the two approaches as well (Duran, Fox Davis, & Allione, 2008; Yellow Bird, 2013). Previous research with Aboriginal populations has shown that healing within this community involves more than just treatment for specific problems. Instead, healing is considered a process involving the acknowledgement of suffering, sharing of personal struggles, ongoing introspection, and actively working towards better self-understanding (Gone,

2009). All of these aspects of the healing process are facilitated through the teachings and practices of mindfulness interventions.

In the present study, we taught mindfulness practices as suggested in MBSR guidelines (Santorelli & Kabat-Zinn, 2009), but some modifications helped to tailor the delivery of the program to an Aboriginal population. Most importantly, we involved Aboriginal leaders and community members in the development and administration of the intervention (French, 2004; Thompson, Gifford, & Thorpe, 2000; White, Smith, & O'Dowd, 2005) and we incorporated culturally appropriate material into the teachings (French, 2004; Young, Reading, Elias, & O'Neil, 2000).

Our separate quantitative study (Dreger, Mackenzie, & McLeod, 2013) provides preliminary evidence for the effectiveness of our modified MBI in this historically underserved population. As this appeared to be the first study to investigate the effects of an MBI with an indigenous population, we also wanted to qualitatively evaluate the feasibility and acceptability of the intervention through the reported experience of the participants. The present study adds to the growing body of qualitative research for MBIs (Cairns & Murray, 2013; Malpass, et al., 2011; Wyatt, Harper, & Weatherhead, 2014). It is aimed at answering the questions of suitability of the program and its content in an indigenous population, its perceived value, and recommended changes, which together are intended to inform future applications of the intervention.

### **Method**

This qualitative study was the second part of a two-phase, sequential mixed methods design (Creswell, 2009) aimed at determining the feasibility of a modified MBI for Aboriginal adults with type 2 diabetes. The initial quantitative analysis, which

focused on biological outcomes and self-report measures of physical and emotional health, demonstrated significant and clinically important health improvements following completion of the modified MBI (Dreger, Mackenzie, & McLeod, 2013). The present qualitative analysis was intended to gain a deeper understanding of the subjective experiences of the Aboriginal participants to better determine the suitability and feasibility of the program within this population. Both parts of the mixed-methods study received ethics approval by the Psychology and Sociology Research Ethics Board of the University of Manitoba.

In an effort to ensure the intervention was suitable to the intended population, we followed recommended guidelines that support cultural relevance including: incorporating the input of community leaders in the planning, implementation, and evaluation of the program; using familiar locations for the program; using culturally relevant images in the program materials; and including traditional activities (e.g., storytelling) in some way (LeMaster and Connell, 1994). Working in collaboration with Aboriginal community leaders (cultural advisors, spiritual leaders/elders, & Aboriginal health services providers), we modified the program as necessary to make it culturally appropriate.

The primary instructor of the program was a doctoral-level clinical psychology student with training and experience in teaching MBSR. She met all guidelines for recommended skills and personal practices for MBSR instructors as outlined by Santorelli & Kabat-Zinn (2009). In addition, the instructor had knowledge of Aboriginal culture and traditions gained through clinical training and experience, conversations with Aboriginal leaders and community members, and through direct experience with



Aboriginal practices (e.g., attendance at numerous sharing circles and sweat lodge ceremonies). According to McIntyre (1996), conventionally trained psychotherapists are often not well prepared to facilitate healing in Native American clients. Therefore, to compensate for any lack of understanding of Aboriginal culture and healing processes as well as to ensure cultural relevance and sensitivity during the implementation of the program, an Aboriginal Cultural Advisor trained in MBSR practices acted as a co-instructor for the initial offering of the program and remained as a consultant for subsequent groups. The Cultural Advisor, Brian McLeod, explained that he shares teachings from many cultural heritages, primarily from Cree, Ojibwe, and Lakota traditions but that he strongly believes that teachings come from all life.

Our modified program is described in detail elsewhere (Dreger, Mackenzie, & McLeod, 2013). In brief, the program consisted of eight weekly, 2-hour group sessions and we asked participants to develop a home practice of 20-30 minutes per day, five days per week. Sessions took place at well-known, centrally located centres that offer substantial Aboriginal programming. We made an effort to ensure that the program was equally accessible to all participants regardless of their education histories and we incorporated several cultural traditions into the program to assist with teaching (e.g., story-telling, traditional teachings, a Medicine Wheel). We used the typical MBSR class format, which emphasizes equality through the class configuration of a large circle, with the instructors being a part of the circle. We expected this configuration and the key training component of the sharing with other group members to be reminiscent of traditional Aboriginal sharing-circles and thought this might solidify a sense of community among group members.

We invited participants who completed the modified MBI to attend a qualitative interview; all participants provided their written consent (Appendix B) prior to the interview. The interviewer was the primary investigator and program instructor who knew all of the participants and was very familiar with the program. While there was the risk of a positivity bias on the part of the participants, we viewed the benefits of having an established relationship with the interviewer as outweighing this potential bias because it likely facilitated sharing. Another potential bias existed on the part of the interviewer who, as the program instructor, had a positive view of the program. The interviewer attempted to buffer this bias by using questions that were open-ended and non-leading, and by adhering closely to the interview protocol for all interviews (see Table 1). The interviewer's familiarity with the program, with Aboriginal culture, and with individual participants can also be seen as a strength, as it enhanced understanding of the participants' responses.

**Table 1.**

*Sample Interview Questions*

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I would like to hear your story about being involved in the MBSR program. Tell me about your experience with the program.

What were the factors involved in your decision to participate in the program?

Were there any challenges to participation in the program?

Thinking about the program itself...

i) Were there things that you liked about the program? If yes: What did you like and why?

ii) Were there things that you did not like? If yes: What didn't you like and why?

Would you make/recommend any changes to the program? If yes: What would you change?

In your opinion, who would be the best person to run this program? What instructor characteristics are important to you?

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The semi-structured interviews took place within 2-6 weeks of program completion and generally lasted between 40 and 65 minutes. The interview consisted of questions aimed at understanding each participant's experience with the program, such as the factors that were involved in their decision to attend, their impressions of the program content, and any suggested changes. The first author conducted the interviews in a quiet, comfortable setting of the participants' choosing. The majority of participants chose to be interviewed in their homes, but other settings included restaurants and other familiar community locations. Interviews were audio-recorded and then transcribed verbatim. The interviewer reviewed and verified all transcripts for accuracy.

### **Analytic Approach**

With an interest in identifying the common themes in the participants' experiences with the program, we conducted a thematic analysis (Braun & Clarke, 2006) of the transcribed interviews. We used Ritchie and Spencer's (1994) thematic framework analytic approach, which offers clear, systematic directions for analyzing qualitative data and flexibly allows analysis both within and across participants at a variety of levels of abstraction. With the intention of mapping the range and nature of the participants' experiences with the mindfulness intervention, we kept the analysis closer to a descriptive level. Therefore, rather than using increasing levels of abstraction to derive some higher order meaning from the data, we kept the analysis less interpretive and closer to the described experience of the participants.

The framework analytic approach consists of five interconnected stages: familiarization, identification of a thematic framework, indexing, charting, and mapping and interpretation (Ritchie & Spencer, 1994). The first stage, familiarization, involves a

thorough review of the data. In this stage, the first author listened to interviews and read and re-read transcripts. After being immersed in the richness of the data for some time, clear themes began to emerge, which led directly into the second stage of the analysis, identifying a thematic framework. While some of the themes came directly out of the interview questions, we identified others from participants' responses.

With the thematic framework identified, the work of indexing, the third stage of the analysis, began. This process involved systematically applying the index to all of the data using thematic codes. The next stage of the analysis, charting, involved inserting the textual data into a thematic chart (large spreadsheet) according to the index codes. The fifth, and final, stage of mapping and interpretation consisted of viewing the data as a whole and analyzing it for further associations and overarching themes by comparing and contrasting the experiences of the participants. Keeping with our goal of gaining an understanding of participants' perceptions of, and experiences with, the mindfulness-based program, we kept the interpretation at a minimal level of abstraction. The primarily descriptive results helped us to determine the program's potential in this novel population and to inform possible future applications of the program.

### **Rigour**

We used a number of methods to ensure the trustworthiness of our analysis and results (Creswell, 2009; Lincoln & Guba, 1985). For the interview process, we used a standard set of interview questions administered by the same interviewer throughout the study. Together, our research team developed the interview questions and, as the study progressed, collectively modified the questions for ease of understanding by the participants and to enhance exploration of identified themes. The first author checked all

transcripts for accuracy and was primarily responsible for creating the thematic framework. Two other members of the research team indexed a random selection of one-third of the interviews. For any discrepancies in indexing, we came to a consensus through discussion and modified the index, when necessary, to best fit the data. We also ensured consensus for the interpretation of the data, with team members agreeing on the final descriptive themes and categories. The detailed description of our methodological process should assist with determining the credibility of our results. In addition, we have included a description of the sample characteristics to facilitate the understanding of the transferability of our results.

Finally, we sought feedback from participants to confirm that the themes and categories constructed through analysis were an accurate reflection of their views and experiences. As a measure of respondent validation (Lincoln & Guba, 1985), we created a summary of the derived themes and categories and invited the participants to review our work for accuracy and accessibility. From the 11 participants to whom we mailed a copy of the summary and a brief questionnaire, we received three anonymous responses and one was returned undeliverable. On a rating scale of 1 to 7, participants indicated that the summary was highly understandable and that they strongly agreed with the findings (on both questions, two participants gave ratings of 7/7 and one gave ratings of 6/7). In the optional written comments section, participants discussed their enjoyment of the program and the desire to see the program continue. Other comments were re-iterations of the summary and an echoed agreement with the findings. One expressed gratitude to the instructor for being “open, non-judgmental, and respectful.”

## Results

Of the 12 participants who completed the MBI program, 11 took part in the qualitative interviews. One participant did not take part in this study because we lost contact with her. Interviewees were primarily female (91%) with an average age of 60 years ( $SD = 8.7$ ). The sample was fairly evenly split in terms of Aboriginal status (First Nations and Metis), marital status, employment status, urban versus rural (including reservations) residence, and low versus moderate socioeconomic status. The educational attainment of participants ranged from grade 6 to a university degree (mean of 11.8 years;  $SD = 3.3$ ) and the average duration of diabetes was 10.4 years ( $SD = 12.2$ ) and ranged from newly diagnosed (6 months) to long-term (39 years). Participants attended an average of 6.8 of the 8 program sessions ( $SD = .98$ ; range = 5 to 8 sessions). A more detailed description of participant demographics is available elsewhere (Dreger, Mackenzie, & McLeod, 2013).

The framework analysis revealed three main themes from participants' discussion of their experience with the program: Factors associated with participation, consequences of participation, and suggestions for future programs. Within each of these overarching themes, we identified several thematic categories, which are described in detail below.

See Figure 1 for a diagrammatic overview of the main themes and categories.

### **Factors Associated with Participation**

We identified three main categories with regard to participation in the program: Factors associated with initial participation, factors supporting continued participation, and challenges to participation. Within each of these categories are a number of sub-categories that elucidate the participants' experiences with attendance and adherence.

### **Theme 1: Factors Affecting Participation**

#### **Initial Participation**

- Health concerns
- Trust needs met
- Intrinsic motivation
- Program attributes

#### **Continued Participation**

- Social aspects
- Program content
- Perceived benefits
- Personal factors

#### **Challenges to Participation**

- Internal barriers
- Circumstantial challenges
- Program elements

### **Theme 2: Outcome**

- Increased awareness
- Improved health and wellbeing
- Behavioural and attitudinal change
- Positive regard for the program and practices

### **Theme 3: Future Programs**

- Advertising
- Add incentives
- Program components
- Program delivery

Figure 1. Summary of Thematic Categories

**Factors leading to initial participation.** When discussing the factors leading to their decision to take part in the program, participants identified four sub-categories as important to their initial involvement. These were: 1) Health-related concerns, 2) satisfaction of trust and safety needs, 3) intrinsic motivation factors, and 4) specific program attributes. The majority of participants identified a *concern for their health* as a primary factor in their decision to take part in the program. They expressed concerns with both physical health (e.g., “I was just, just at the starting point of having to definitely control this [diabetes],” P 2) and emotional health (e.g., “I thought ‘oh,’ this might be something that would help me...my life can be quite stressful at times and sometimes it’s um, uh, it’s myself putting stress on myself, “ P 6). One participant also identified a concern for the health of family members as an initial motivating factor, explaining that she wanted to be better equipped to help them.

Referring to their *need for trust*, several participants discussed the importance of a recommendation from a health professional or from trusted friends and family members as instrumental in their initial involvement. Others referred to preliminary trust-building conversations with the researchers as important in their decision to take part. *Safety needs* were met in terms of trusting the study staff and feeling safe and comfortable with the program locations. Speaking to the location, one participant had the following to say: “and your building because you, um, well Klinik, because they are into safety issues and awareness and that type of thing...and so you sort of feel safe there” (P 6).

Participants identified such *intrinsic motivating factors* as curiosity about the program, a desire to learn new things, and an interest in personal growth as important in their decision to take part in the program (e.g., “the fact that it was stress reduction, you



piqued my curiosity...because I'm aware that I have some stressful habits. I was open to um, uh, improvement," P 6). Specific *program attributes* were also named as contributors to their initial participation in the program. Some of these program factors were its non-medical/alternative approach, the cultural aspects of the program, and more practical aspects such as the convenience of the location and time of the sessions (e.g., "the fact that it was during the day was one of the good things that attracted me to it," P 7).

**Factors supporting continued participation.** When speaking about what kept them involved in the program, participants identified four sub-categories of motivating factors. These included social aspects of the program, program content and delivery, perceived benefits from attending, and personal factors. In terms of *social aspects*, participants appreciated the sharing that took place each week and the ensuing validation and normalization that they experienced, "It was helpful knowing others were having the same issues as me...that made me feel better" (P 4). Participants also spoke of feeling supported by the group and talked about having fun with the other participants.

Participants identified aspects of the *program content and delivery* that supported their continued involvement as well. These included such things as the teachings and practices, the homework assignments, the instructors, the mind/body approach, the cultural components, and the fact that the program was interactive and experiential rather than lecture-based. With regard to the cultural components, some were specifically interested in them while others appreciated a perceived subtlety of their inclusion: "The cultural component wasn't loud...not center-stage as in 'you have to be cultural about this'" (P 1).

Participants also referred to *benefits* of attending the sessions that kept them coming each week. For example, “ After...the first few sessions I could start seeing the benefits of it, I was looking forward to going” (P 6). Another had this to say:

If there was a benefit there for me, why wouldn't I go for it? I mean I'll find out as soon as I'm there. If there isn't, I walk away. But I did find benefits. That's why I kept going, eh. (P 8)

Participants described such benefits as feeling more relaxed, energized, or just generally feeling 'better' following the sessions. One participant had this to say about how noticing benefits contributed to continued attendance:

It helped me, especially when you're having a bad day. It helped with wanting to stick with it. Just coming to the class helped a lot...wanting to stick with it, like having that attitude that, if you come, you'll learn something or you'll get something from it. (P 9)

Another had this to say about how attendance was beneficial:

I just enjoyed being in the presence of you guys and, anything that I would carry in with me, if I had a headache or if I had something going on when I got in there, it was, I could share it with you or not and, uh, I always felt better after I left. (P 5)

Finally, *personal factors* that maintained participants' involvement in the program included appreciating the break in their daily routine, valuing taking the time out for themselves, and honouring a personal commitment to complete the program. Speaking of her personal commitment, one participant shared the following:

I've been a quitter and I don't want to be a quitter. And I'm, now I'm trying to, if I start something, I'm going to finish it. One way or another, I'm going to finish it.

I'm not going to quit. I'm going to do it right through to the end. And that was it.

I didn't want to disappoint myself. I didn't want to disappoint you. I didn't want to disappoint anyone, so, 'I gotta do it'. (P 4)

**Challenges to participation.** Participants identified three sub-categories of barriers to participation in the program and, within these categories, also described some methods used to overcome the barriers. The sub-categories are: internal barriers, circumstantial challenges, and program specific difficulties.

*Internal barriers* included such qualities as doubt about the usefulness of the program and its practices (e.g., “[I wondered], ‘is there going to be some benefit here or am I wasting my time?’,” P 6; “At the beginning, I didn’t think it would help me but then it did,” P 11), uncertainty about their performance of the practices, low energy, lack of motivation, and fear. The fear participants described was mainly social anxiety related to sharing personal experiences with the group and being judged by fellow participants. One participant illustrated this fear of judgment with the following statement: “I didn’t like having to take the shoes off. I had to make sure I had clean socks on ‘cause I didn’t want people to see holes in my socks” (P 9). Another shared this: “On the first day I wondered what I was doing there, what was going to happen, ‘will I be punished for swearing too much?’” (P 7).

In order to overcome these internal barriers, participants spoke of focusing on listening to what other participants were sharing until they felt more comfortable with the group to share their own experiences. They also discussed making a personal commitment to attend each week to overcome their feelings of low energy and lack of

motivation. Attending each week was reportedly beneficial in alleviating their doubts, uncertainties, and fears.

I think we were all a little, initially, apprehensive. But then, of course, once we became more familiar with each other and felt comfortable with each other...we knew we were in a safe atmosphere. If somebody wasn't sure of something, it was a safe enough atmosphere where you didn't, uh, you didn't worry about asking a question or, 'maybe they're gonna think I'm stupid' or something like that. (P 5)

*Circumstantial challenges* included poor weather (e.g., "It was pretty darn cold some nights...tough to make it out to sessions," P 6); acute health concerns; busy and highly stressful life conditions (e.g., numerous work & volunteer commitments, family and community concerns, low income living); and distractions while meditating, both in session (e.g., hallway noises, phones ringing, late attendees) and during home practice (e.g., interruptions by family members, sirens, booming car radios, and airplanes overhead in their neighborhoods). Participants spoke of overcoming these circumstantial challenges in a variety of individual and creative ways such as prioritizing the sessions in their daily schedule or planning nothing else for the day to help ensure that no conflicts arose, minimizing distractions by finding places to practice away from family members, sharing the practices with family members, or adding 'white-noise' to minimize neighborhood sounds (e.g., running a fan). Participants included the meditation practices in their busy days by engaging in them on daily walks, on the bus, or in their cars.

I liked being able to have it [audio files of guided practices] on my phone. Now sometimes when I'm at work—I spend a lot of time in my car—I have my headset

for my phone in my work bag, so a lot of times, when I've got nothing to do, I sit there and I play them. And then I also have the CD in my car. (P 10)

The final barrier to participation involved *program specific challenges* such as difficulties with some of the practices. Many of these challenges were overcome through individual adaptation of the practices. For example, one participant described how she modified the mindful eating practice that she found difficult:

I don't like...touching food. Once I played with it, I couldn't eat it because you don't play with your food. I think when we did that I would do something else...so I was still doing the practice, but a different way. (P 7)

Also identified as challenging was the amount of time required to acquire the skills and achieve benefits. Some participants added that it was worth the effort and that they recognized that they got out what they put into it: "You have to practice these things for sure...and then doing it over and over and over and then eventually you get the real benefit from it" (P 2).

Many participants described having a number of these challenges to overcome throughout the program. One participant, who was doubtful and apprehensive at first, had difficulty fitting the sessions and practices into her schedule--it took her time to appreciate the value of the program and notice real benefits. She spoke about how and why she continued with it despite these challenges:

After a while, it was like I looked forward to going. It took a while for me to grasp the concept and, you know, the theory behind or the reasons behind, you know, the exercises and everything. I guess the thing is...maybe I'm just full of doubt or just a little...wary. After a while, it was like...it wasn't so bad. I guess once I got into a

routine, you know, knowing I was coming and sort of planning around it. The first few times was like, oh, I don't have time for this type of thing. So it was just having the mindset that okay...it's only going to be for so long and I come to realize that, okay, these exercises are good, she's [the instructor] making me slow down...and uh, take a look at what I do... it was just good exercise and I was thankful for that. (P 6)

### **Consequences of Participation**

Participants spoke of several outcomes resulting from participation in the mindfulness-based program that fell into one of the following four categories: 1) increased awareness, 2) improvements to health and well-being, 3) behavioural and attitudinal changes, and 4) positive regard for the program and practices.

**Increased awareness.** Most participants identified increased self-awareness as well as awareness of the world around them as a significant benefit of participation. One participant shared the following:

[the program] makes you more aware of the world around you, the way you think, the way you process your thoughts, and some of the practical things you do...that was a re-awakening of the awareness of your own body. (P 7)

In terms of *self-awareness*, participants described being more fully aware of their moment-to-moment experience, including their actions, thoughts, and emotions. They spoke of being more aware of their bodies and body sensations during routine daily tasks (e.g. bathing, brushing their hair, eating, cleaning the house) and of catching their minds wandering off to fears about the future or concerns about the past. Participants also became aware of automatic behaviours such as reaching for carbohydrate snacks when

feeling bored or the tendency toward keeping very busy, multitasking, and noticing the impatience that arose when trying to sit still. With heightened awareness, a few participants recognized unhelpful emotional and behavioural patterns, which led them to consider seeking help. One participant described it in this way:

With this new understanding, I thought maybe it's time to talk to a professional about certain things...maybe just dealing with them and getting them out, instead of always kind of shoving them under the rug. (P 3)

Participants also described a heightened *awareness of their environment* including the physical world around them and the people in their lives. Some participants were surprised to learn that they were not previously more aware of their experience. One participant stated: "It's strange but you don't realize you can go through a whole day, through days, and not really focus on anything" (P 5).

**Improvements to health and well-being.** Another very common outcome identified by the participants was improvement in their physical and emotional health and overall well-being. In terms of *physical health*, aside from noticing reductions in blood sugar, participants reported such health effects as improved sleep, more energy, and fewer headaches. One participant who was having particular difficulties regulating her blood sugar stated that she wished she could have had her blood sugar checked by her diabetes specialists following the program sessions when she noticed that her blood sugar readings were lower:

When I would come to class on the Wednesdays and when we did 3 or 4 exercises, I'd find that that helped a lot...the next day I would be almost normal when I got up...[my diabetes specialists would say] 'you've got some good readings in there'

but they don't realize that that was because I was taking your class and so that calming thing was coming into factor and that's why my readings were low... Yeah, so that helps to get it regulated... I did notice on the days after [the sessions], I would get more normal readings. (P 10)

Many also reported improvements to *emotional health and well-being* such as better emotion regulation (e.g., reduced anger, less emotionally reactive), worrying less, and feeling generally less stressed and more relaxed.

It helps with anger. I used to be so angry all the time, always mad at my son. I learned to deal with it, learned to control my anger... getting mad all the time, being upset with him, I don't do that anymore. (P 11)

Another participant described her improved emotion regulation this way:

I guess the most important thing is for me I can handle situations a whole lot different now. I don't react as fast. I'll give you an example, I was coming here and there was an accident on the corner of Jefferson and McPhillips and that car was identical to my son's. My heart would have stopped before. Waiting in anticipation to make sure it wasn't him. And it was kind of like 'Oh it's just a car. And if it's my son I will see that, and if it's not, then I'll just drive on. 'Cause before I would have, like I said, I would have damn near had a heart attack. My heart would have just stopped in its tracks. (P 1)

In terms of general well-being, one participant had this to share: "After the first session, I realized I was just kinda walking a lot softer on the planet" (P 8).

**Behavioural and attitudinal changes.** The majority of participants spoke of healthy behaviour changes and/or changes to their attitudes and outlooks as a result of



attending the program. Behaviour changes included smoking less, eating less and making healthier food choices, using less profanity, checking their blood sugar more often, listening to others more, and being more assertive. One participant had this to share about choosing a healthier behaviour to cope with stress:

I don't grab a beer now, I just put in the earplugs, get into a comfortable chair, sit back, and go through it. After about 20 minutes or half an hour, I find that I'm coming down a couple notches. Then I'll get busy on what I'm behind on. (P 8)

Another shared the following about the effects of attending the sessions:

It was interesting because when I came... and got into it for that whole 2 hours and I was here, I didn't want to smoke. I didn't even have a craving for a smoke. You know, when I got here at 1:00 and sometimes I didn't leave until 3:30 but, it was during that time, I was thinking well there must be something...that I'm doing here that stops that craving. (P 4)

A few participants also spoke of improved self-regard that included an increase in self-compassion and taking more time for themselves to do more of what they enjoy doing. In terms of attitudinal shifts, program participants described having a more positive outlook, more patience, increased acceptance, and heightened compassion and understanding for others, which, in some cases, reportedly led to improved interpersonal relations. One participant described how a shift in attitude, to one of more acceptance, led to improved family relationships:

I learned how to stop hanging onto things, learned how to just experience things good, bad, or whatever. It helped with family troubles. I'm learning how to let go....just to leave them and go on to the next moment. (P 2)

**Positive regard for the program and its practices.** All of the participants stated that they enjoyed the program. Several reported a desire to continue attending, saying that they felt they could learn more and increase the perceived benefits they obtained. Positive regard for the program also was indicated in participants' continued use of the practices in daily life and a tendency among a majority of participants to recommend the program to others or share what they had learned. They also expressed an expectation of further benefits to come from continued practice. Some participants made a comparison between the program and Aboriginal ceremonies such as sharing circles and sweat lodges, stating an appreciation for this observed similarity. Another participant made a similar comparison to Christian teachings, saying: "[the program material] really connected to a lot of scripture that I study" (P 8). One participant expressed her appreciation for how much she valued the program in this way: "If I had to put a dollar figure on it, God, I would never be able to pay you," P 1.

### **Suggestions for Future MBI Programs with Aboriginal People**

Apart from stating that they enjoyed the program, the most frequent comment made by participants was the suggestion to continue offering the program in the Aboriginal community. When discussing how best to continue offering the program, participants made comments along the following lines: 1) advertising, 2) incentives for attendance, 3) program components, and 4) program delivery.

**Advertising.** In terms of advertising or marketing the program to the Aboriginal community, several participants stated that it was word-of-mouth, or recommendations from trusted individuals, that would be most effective. Trust was identified as crucial in people's decisions to take part in a program. One participant who was involved in

providing programming to the Aboriginal community spoke of her own experience in recruiting program members: “It took me four years to build the trust I have now in the Aboriginal community even though I’m Aboriginal myself” (P 1).

When speaking of their preference for word-of-mouth recommendations as a form of advertising, a number of participants offered, unsolicited, to help in this regard. One participant stated that she would be happy to provide a written endorsement and others offered to talk to people about it. One participant said it this way: “Give them my email and I’ll say, hey, I took the class, it was great. You’ve got to take it, you’ve got to do it” (P 9). Other suggestions for promoting the program included emphasizing the mind/body approach, making an explicit connection between stress and health, or specifically referring to the quality of awareness in the promotion of the program. Apart from crucial word-of-mouth advertising, several ideas were generated for where to advertise and included such suggestions as television and radio, First Nations’ websites, Aboriginal centres and events, health centres, and via flyers delivered to people’s mailboxes.

**Incentives for attendance.** When suggesting incentives for future programs, participants referred to the commonly stressful lives of their community members and the tendency for health matters and self-care to become less of a priority over managing daily needs. Many expressed the importance of attending several sessions for benefits to occur and suggested that attendance could be enhanced by providing child-care, door-to-door transportation, and financial incentives for attending.

**Program components.** In terms of program content, while the majority of participants stated that the program was good the way it was and no changes were necessary (e.g., “Don’t change anything,” P 6), some participants expressed preferences

for more or less of particular practices. For example, some saw value in the meditation practice of forgiveness, both for themselves and for other members of the Aboriginal community, and suggested using it more often during the program while another participant who found the practice particularly difficult suggested using it less. Similar recommendations based on personal preference were for more or less sharing during the sessions, more or less cultural content, and more or less structure to the teaching format (i.e., adhering strictly to an agenda or not). One person recommended taking more time during the initial session to more fully explain the rationale for the program, perhaps even extending the first session by a half-hour or so. The participant making this suggestion thought it would be particularly helpful for people who were unaccustomed to alternative health approaches in general and mind/body practices in particular.

**Program delivery.** Program delivery was the final area identified as requiring consideration for future administrations of MBIs in the Aboriginal community. One aspect of program delivery that participants identified as important was *language*. One participant made the suggestion to offer the program in native languages to accommodate those who do not have English as their first language. The participant added that collaboration with an interpreter might be helpful in this regard. Others spoke to the importance of keeping the use of language accessible to those with all levels of education, as we did, and not alienating participants by speaking over them with scholarly language. Supporting this recommendation, one participant shared the following about the instructors: “You were well spoken. Your dialect wasn’t to the extreme of a professional. Everybody understood fully what you were saying” (P 7).

Participants indicated that *logistic considerations* were important as well. They made several suggestions for program location and time, duration of individual sessions, number of sessions, and sizes of groups for maximum benefit. Depending on their particular circumstances and viewpoints, participants differed in their specific recommendations about these details. With no consistent suggestions, no clear required changes emerged.

The final area of consideration discussed was that of *instructor characteristics*. Somewhat surprisingly, participants did not report a preference for having an instructor of Aboriginal descent. One participant stated she would prefer someone with a connection to the reservation community she lived in while another from the same community stated a preference for an “outsider.” Others reported preferences for someone well educated and with knowledge of diabetes or personal experience with diabetes. When no one stated a preference for the instructor’s ethnicity, we explicitly posed the question of whether or not they would prefer an instructor of Aboriginal descent. Each participant stated that this was not personally important to them but several added that it would be important for some Aboriginal people. Speaking to this, one participant stated: “I think in most cases, yeah, they would want, they would want an aboriginal person. It probably would help, yes, it probably would help. But see, to me, that’s almost a non-issue” (P 6). Another had this to say: “I don’t think [being Aboriginal] is important. If there were doubts on the Native side, Brian [the Aboriginal elder acting as co-instructor and consultant] inspired that, right?, and brought that connection in” (P 7).

The majority of suggestions for instructor characteristics revolved around preferences for personality factors and the instructor’s interpersonal approach such as

being non-judgmental, open, genuine, kind, non-reactionary (e.g., not shocked by experiences shared by participants), patient, engaging, trustworthy, and sensitive to the concerns of, and difficulties in, the Aboriginal community. Qualities of self-awareness, fortitude, and confidence also were described as important. Most participants were referring to the characteristics they recognized in the instructors throughout the program. When asked what instructor characteristics would be important, one person stated it this way: “Like understanding, non-judgmental, and all the characteristics you have. The soothing sound of your voice and, I don’t know, like your qualities” (P 9).

### **Discussion**

With this study, we set out to develop a better understanding of the suitability and perceived value of a modified MBI for Aboriginal adults with diabetes and to determine potential future modifications to the program and its delivery that would better serve the community. From their responses, it is clear that the participants enjoyed the program, valued its content, and perceived numerous benefits from attending. Participants also suggested that the program could benefit their fellow community members; each participant requested that the program continue in their community. Consistent with these comments, most of the participants had recommended the program to others and several were sharing what they learned with friends, family members, and co-workers. Participants also offered some useful suggestions to further modify the program to better meet the needs of their community members. These findings add to our previously reported quantitative results that indicate significant physical and emotional health improvements following the program (Dreger, Mackenzie, & McLeod, 2013).

The acceptability of MBIs in an Aboriginal population is supported by the continued involvement of our participants, their positive views of the program and its practices, and the perceived value of attendance. Participants explicitly stated that they thought the program would benefit others in their community and that they would like to take part in it again, all of which suggests that the program is suitable for at least a segment of the population.

Our participants described finding several program components agreeable to them, which supports the suitability of the program for this population. Consistent with what is known to be important for health programming and the promotion of wellness with Aboriginal people, our participants described appreciating the embedded cultural components such as storytelling and traditional teachings (French, 2004; LeMaster & Connell, 1994; Young, Reading, Elias, & O'Neil, 2000); the interactive and experiential approach to the program's teachings (Ringwalt & Bliss, 2006); sharing with other group members (Iwasaki, Bartlett, & O'Neil, 2005; Ringwalt & Bliss, 2006); and the program's compatibility with their spiritual beliefs--whether traditional or Christian (Iwasaki, Bartlett, & O'Neil, 2005; Ringwalt & Bliss, 2006). In addition, several participants expressed an appreciation for the mind/body focus of the teachings and practices (McCabe, 2007; 2008 and Renfrey & Dionne, 2001) and some made reference to enjoying the similarity of the MBI program to their cultural practices (e.g., sweat lodge ceremonies and sharing circles).

Participants' perceived benefits also support the feasibility of MBI programs for this population. Benefits were reported in the areas of behaviour change, physical and emotional health improvements, enhanced sense of well-being, increased self-awareness

and self-acceptance, and improved interpersonal relations. For a few participants, the increased self-awareness led to insight into other problems in their lives and generated some motivation to address them, which speaks to the potential for further benefits from attending the program. These subjective accounts were corroborated by improvements on more objective measures of health such as blood sugar levels and blood pressure (Dreger, Mackenzie, & McLeod, 2013), which provides additional evidence for the applicability of the program in the Aboriginal community.

Although all participants reported general satisfaction with the program as it was delivered, some offered suggestions for change to future programs to encourage participation, increase attendance, and facilitate acquiring benefits. Incorporating some of these suggestions into future programs may contribute to the success of the programs and future studies. It is important to note, however, that there was no consistency in reported preferences for program changes so no clear modifications to the program itself are supported in terms of teachings, practices, cultural adaptations, group size, and session time or place.

Given that participants expressed initial difficulty with understanding the purpose of the practices and how they related to improvements in health and wellness, in the future, it might be helpful to place additional emphasis on the fact that mindfulness and its benefits do not come from an intellectual understanding but from experiential learning through practice. Normalizing the difficulty in understanding how or why mindfulness can be helpful might reduce the initial doubt, confusion, frustration, and self-criticism that can arise. As some of our participants reported, continuing participation for a few weeks before making any firm decisions about the usefulness of the program can be



helpful. Therefore, sharing feedback from previous participants regarding how long it takes to 'get it' and encouraging future participants to make a short-term commitment to the program before deciding on its efficacy may help ensure the program's success. Emphasizing the importance of regular practice and sharing previous participants' reports of getting out what they put in also might be helpful. Sharing the barriers to attendance and daily practice of previous participants and their solutions overcome them may assist with commitment. In addition, allowing adaptation of the practices to accommodate personal preferences may support continued involvement.

As requested by several of our participants, an additional consideration for change would be to freely offer re-registration for those wishing to continue with the program to garner further benefits from it. As suggested by our participants and by researchers interested in cultural tailoring for Aboriginal people, language, both spoken and in written materials must remain accessible to those with English as a second language or with lower levels of educational attainment (Ringwalt & Bliss, 2006).

The participants involved in our study indicated that at least some people in their community would deem it important for program instructors to be Aboriginal or to have ties to the Aboriginal community, but that this was not a concern for them. Knowing the interviewer was not of Aboriginal descent may have biased their stated lack of preference but the fact that participants were aware that the primary instructor was not Aboriginal prior to making their initial decision to take part in the program supports the validity of their claims. Furthermore, attendance was not greater for the program with an Aboriginal co-instructor than it was for the programs with only one, non-Aboriginal instructor. What was clear was that participants wanted an instructor who was compassionate, genuine,

non-judgmental, and sensitive to the concerns of Aboriginal people. For this particular group of people, having an instructor of Aboriginal descent seemed less important than having an instructor with these characteristics.

Although Aboriginal people make up approximately 17% of the population in Manitoba (Statistics Canada, 2011), the Canadian province in which we conducted our study, and diabetes is a prevalent health concern in this segment of the Canadian population (3 to 5 times the non-Aboriginal average; Statistics Canada, 1993), recruiting participants for our novel program was quite difficult. This could be interpreted as evidence against its suitability within the population but we believe several factors unrelated to the program itself likely contributed to our recruitment difficulties.

Challenges with recruitment are common in research with indigenous populations, such as self-exclusion due to lack of resources (time, transportation, child-care); valuing privacy; and managing the burden of poor health, low income, and other daily stressors that often come from being part of a marginalized community (Hodge, Weinmann, & Roubideaux, 2000). Our participants spoke about several of these factors as barriers to their own initial and continuing participation and made reference to these challenges for others in their community. Despite these reported barriers, our participants enjoyed and valued the program and experienced significant health benefits, which speaks to the potential of the program within the population despite these difficulties. Addressing some of these challenges may enhance the success of future programs or studies.

Another crucial factor contributing to recruitment difficulties with indigenous people is a cultural history of negative experiences with researchers that includes lack of community consultation, disrespect for their culture, minimal communication about the

research, lack of informed consent, and no ultimate benefit to the community (Hodge, Weinmann, & Roubideaux, 2000). Our participants highlighted trust as vital to the acceptance of programs in their community and referred to their own need for trust in the researchers and program instructors prior to involvement in the study.

The issue of trust was a thread throughout several of the themes and categories identified in the participant interviews and will likely be a major factor in the success of future programs. For example, the importance of trust showed up in the initial decision to take part; participants spoke of requiring a referral from trusted others or a need to develop sufficient trust in the researchers through conversing with them prior to involvement. The need for trust also appeared in participants' difficulty with speaking and sharing in the group out of concern for being judged, in the location of the sessions, and in participants' ability to "get" the teachings and practices and to benefit from the experience. Participants made suggestions on how to address this important need in future programs.

To address trust needs within their communities, participants emphasized the importance of word-of-mouth advertising via recommendations from trusted others. Given this preference, the tendency of our participants to make unsolicited recommendations to family and other community members provides some optimism for the future success of the program. It would likely take considerable time to build the program up to full capacity with this method of growth but, once sufficient trust exists, the program would likely be sustainable. The process of growth may be sped up somewhat with referrals by health care professionals as several participants mentioned that encouragement from health care providers influenced their decision to take part.

Once interest grows through sufficient trust in the program and its providers and through increasing evidence for its benefits among fellow community members, the program must remain readily available in order to influence measurable change for this disadvantaged population. To be sustainable, the program must continue to be affordable--free whenever possible, physically and temporally accessible, and an effort should be made to consider child-care and transportation needs. It is crucial that instructors running the program are compassionate, knowledgeable about mindfulness practices, and sensitive to Aboriginal concerns. Training community members to be program instructors and take ownership of running the program within their communities would likely contribute greatly to the success of the program.

While we took great care to ensure the trustworthiness of our data, there are some limitations to our study. As is common in qualitative research, our small sample from a limited geographic area does not allow for the transferability of our results to other Aboriginal communities. Further studies with a range of indigenous cultures are needed to ensure that MBI's are equally suitable and beneficial to other indigenous communities. Also, we interviewed completers of the program only, which may have limited our data in terms of barriers to participation. It may have been helpful to interview the people who called to inquire about the program but chose not to participate or the four participants who dropped out of the program after attending only one session. As reported elsewhere, however, the reasons cited for choosing not to participate or to withdraw from the program fully support our findings regarding challenges to participation (Dreger, Mackenzie, & McLeod, 2013).

Future studies may expand on these findings by targeting other indigenous communities to assess generalization. Both quantitative and qualitative studies would be useful in further investigating the efficacy and acceptability of MBI's in this previously overlooked segment of the population. Modifying the program to incorporate some of the suggested changes may enhance the success of future programs but this would require empirical investigation. For future research endeavors, whether researchers are of Aboriginal descent or not, as the results indicate, trust is a crucial factor in this community and time spent building relationships prior to recruitment efforts would be highly beneficial. It also would be helpful to include community members and potential participants in the study design and implementation (French, 2004; Thompson, Gifford, & Thorpe, 2000; and White, Smith, & Dowd, 2005) and to discuss data ownership and access, including access to results, prior to the investigation (e.g., using the guidelines set out in First Nations Centre, 2007).

In sum, diabetes rates are growing exponentially in recent years and indigenous populations appear to be particularly at risk. In Canada, the Aboriginal population is growing faster than the national average (4 times the average rate between 2006 and 2011; Statistics Canada, 2011) and the health disparity between Aboriginal and non-Aboriginal segments of the population is increasing (Rock, 2003), creating the crucial and time-sensitive need for a useful, culturally appropriate, and cost-effective treatment. Such a treatment could potentially slow this trend and help reduce the burden of disease within this population. The Aboriginal participants in our study found the modified MBI to be both suitable and beneficial. If our results are supported with further research, we may be in a position to provide an easily administered, cost-effective adjunct treatment

for this historically underserved population and begin to reduce the health disparity and improve the lives of many Canadians. This is not only relevant in Canada, but in indigenous communities across the globe.

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## CHAPTER FOUR: GENERAL DISCUSSION

The disproportionately high, and growing, prevalence of T2DM in Canada's Aboriginal population necessitates an effective and culturally acceptable treatment. With my research, I intended to explore the possibility that, with appropriate modifications, a mindfulness-based intervention (MBI) could meet this need.

At the outset of my project, I had planned to extend and improve upon the research by Rosenzweig and colleagues (2007) who found significant physical and emotional health improvements in MBSR participants with diabetes. Reviews of MBI studies (Baer, 2003; Dimidjian & Linehan, 2003) point to the need for more rigorous methodologies with adequate control groups and larger sample sizes that offer sufficient power for the detection treatment effects and it was my intention to address these shortcomings in my research. I intended to conduct a randomized controlled trial in this novel population (Aboriginal adults with diabetes) with a sufficient number of participants in intervention and treatment-as-usual control groups to achieve high statistical power. I also planned to explore possible mediators of the intervention effects.

Unfortunately, after several months of recruitment efforts, it became clear that I would not be able to recruit enough participants for the planned study within a reasonable timeframe for a Ph.D. project. I discuss issues related to recruitment difficulties later in this section. Low recruitment numbers prompted a meeting with my thesis committee that resulted in a change of direction for the research. As a group, we agreed that the research was novel enough to warrant a feasibility study with a smaller number of participants and worked to generate ideas for further recruitment. Immediately following the meeting, I began to implement all of the agreed upon changes by inviting all participants previously

assigned to the control condition to take part in the intervention, expanding my recruitment efforts to include reservation communities within a reasonable driving distance (up to two hours away), and changing the methodology from a randomized controlled trial to a sequential mixed methods design with an initial quantitative study using a pre, post, follow-up design followed by a qualitative study aimed at understanding the participants' experiences with the program and determining its acceptability.

Although the number of participants in these studies limits the generalizability of the results, the mixed methods approach adds richness to our understanding that would not have been achieved by the initially planned randomized controlled trial. Another limitation to generalizability is that the participants were not a representative sample of the general Aboriginal population, which is young (almost 50% under 25 years of age) and gender balanced (Statistics Canada, 2011). Amongst the segment of the Aboriginal population with diabetes, however, the sample is somewhat more representative. Diabetes rates are highest in women and in those aged 40 to 49 years (Dyck, Osgood, Lin, Gao, & Stang, 2010).

The balance of evidence from objective, biological measures, subjective self-report questionnaires, and semi-structured interviews strengthens the credibility of the findings through triangulation (Creswell, 2009). All three forms of data support the feasibility (effectiveness and acceptability) of an MBI for Aboriginal adults with T2DM and, when considered together, serve to increase confidence in this finding.

Below, I discuss how the individual studies of this mixed methods design, quantitative and qualitative, answers the question of feasibility of this novel application

of a mindfulness intervention and then follow that with a discussion of how, considered together, they add to our understanding and contribute to the growing body of mindfulness research. In brief, the quantitative study revealed significant and clinically important improvements on both objective and subjective health measures following participation in the modified MBI. In addition, through subjective ratings from program satisfaction questionnaires, participants indicated that they enjoyed the program and valued what they had learned. The subsequent study, a qualitative inquiry, contributed greatly to our understanding of how the program was experienced by the participants and did so in a way that was, as others have argued, more culturally appropriate (McCabe, 2007). The results indicate that the participants found the program enjoyable, meaningful, and beneficial but that there also were challenges. In addition, through their sharing, participants also provided valuable suggestions for future programs. Collectively, the two studies provide good, preliminary evidence for the effectiveness, suitability, and acceptability of an MBI with Aboriginal adults with diabetes and support further investigation of the program in this population.

### **Quantitative study**

Following participation in the MBI, as hypothesized, participants experienced improved glycemic control and a reduction in blood pressure. Participants also reported subjective physical and emotional health improvements and they evaluated the program positively, which provides some evidence for the feasibility of the program for Indigenous people.

My findings are largely consistent with the results of the study after which I modeled mine, those of Rosenzweig and colleagues (2007) who also found significant

improvements in glycemic control, decreased blood pressure (MAP), and improved subjective emotional health in a similarly sized study with non-Aboriginal participants with T2DM. With respect to changes in blood sugar, my findings differ on a few elements. For example, with the timing of the changes in blood sugar (HbA1c), I discovered significant changes immediately after the completion of the program but not at follow-up whereas they found significant changes only at a one-month follow-up. Given that I collected follow-up data two months after the completion of the program, however, it is difficult to directly compare the follow-up results. Because HbA1c is a biological marker that indicates average blood glucose over the previous two to three months, it is possible that the post-intervention reduction in HbA1c I found would have been significant at a one-month follow-up as Rosenzweig and colleagues found. In addition, unlike Rosenzweig and colleagues who screened in participants with HbA1c levels between 6.5% and 8.5%, I did not screen based on HbA1c levels and included people who were well controlled for this measure (below 6.5%). In the subset of participants from my study who had HbA1c levels over the recommended 7% ( $n = 6$ ), improvements were statistically significant from baseline at both post-intervention and follow-up and, therefore, more consistent with the findings of Rosenzweig and colleagues (2007).

Also supportive of the benefits of MBIs for improvements in HbA1c, is a recent study comparing MBSR with treatment as usual controls (Hartmann, et al., 2012). Another recent RCT (van Son et al., 2013) did not find significant differences in HbA1c following participation in MBCT but glycemic control was a secondary outcome that was measured somewhat unreliably (up to 24 weeks before and after intervention), which



makes it difficult to make a direct comparison. Taken together, these studies do seem to indicate that mindfulness interventions may help people with T2DM control their blood sugar, something that is vitally important given the myriad potential problems associated with elevated and uncontrolled blood sugar levels in patients with diabetes. My study provides preliminary evidence for improvements in glycemic control within the Aboriginal community that is at particular risk for this health concern.

The significant decrease in blood pressure (MAP) I found is also consistent with the findings of Rosenzweig and colleagues (2007), both at post-intervention and follow-up when compared to baseline. A comparison of changes to individual diastolic and systolic measures was not possible because the researchers did not report these measures. Another study looking at the effects of MBSR for participants with diabetes found a significant difference in diastolic blood pressure between MBSR and control groups but no difference in systolic blood pressure, which may be due to the lower average baseline systolic measures in their participants (Hartmann and colleagues, 2012). Reductions in systolic blood pressure are more associated with a reduced the risk of microvascular and macrovascular health complications than diastolic measures in diabetes patients (Campbell et al., 2009) and, therefore, the significant reduction in systolic blood pressure found in my study represents a major improvement in the risk of diabetes-related health concerns (Adler et al., 2000). Evidence for the positive effects of mindfulness interventions on blood pressure exists outside of the context of diabetes as well (Campbell, Labelle, Bacon, Faris, & Carlson, 2012; Hughes et al., 2010).

Also consistent with Rosenzweig et al. (2007), was no significant change in weight across data collection periods, indicating that weight-loss did not account for the

positive health changes. Similarly, changes in diet, exercise, or other self-care behaviours, which were non-significant and associated with small effect sizes, likely did not account for the observed health improvements.

Another important finding in this study was the significant improvement in subjective health. On the health related quality of life measure, participants reported significant improvements in the areas of general health and emotional well-being, which were present at post-intervention and maintained at follow-up. While not significant, we also found small to medium effects for improvements in general psychological distress as well as for depression and anxiety. These reductions in psychological distress are generally consistent with those reported by Rosenzweig and colleagues (2007) and by other mindfulness and diabetes research groups (Hartmann et al., 2012; van Son et al., 2013). Several meta-analyses also indicate, on average, medium effect sizes for emotional health measures following mindfulness-based programs (Baer, 2003; Eberth & Sedlmeier, 2012; Grossman, Niemann, Schmidt, & Walach, 2004; Hofmann, Sawyer, Witt, & Oh, 2010).

Participants' perceptions of their physical health also improved over time, as indicated by improvements in their subjective ratings on physical functioning. Findings did not support change on a measure of life satisfaction and, while this was an unexpected result, participants reported being generally satisfied with their lives at baseline, making improvements on this scale less important as an indicator of enhanced well-being. This seems to have been the case for many of the self-report measures. Overall, at baseline, participants indicated that they were primarily in the normal range for psychological distress and life-stress and had minimal difficulties in terms of quality

of life. There was considerable variability on each of these measures but, on average, baseline scores tended to be in the healthy and well functioning range, which may account for the lack of expected significance in the results. For improvements in well-being, the qualitative inquiry offers information that the standardized questionnaires could not capture and points to clear subjective improvements in well-being.

The general lack of statistically significant improvements in mindfulness was a surprising result but is somewhat consistent with another recent study that investigated the effect of a mindfulness intervention for participants with diabetes and coronary heart disease using the FFMQ (Miller, Kristeller, Headings, & Nagaraja, 2013). Both studies found some indication of change on the ‘observe’ and ‘total’ scales over time and no important change on ‘describing’ and ‘acting with awareness’ scales. Results diverged on the ‘non-judgment’ scale, however; where they found a significant increase on this aspect of mindfulness, participants in my study indicated no change. Although the FFMQ did not clearly indicate an increase in mindfulness, on the follow-up questionnaire, participants reported, in their own words, increases in acceptance and awareness (of self, others, and the environment) and decreases in emotional reactivity and self-judgment. Their reports of change during the qualitative interviews also supports increases in aspects of mindfulness and speaks to the potential lack of sensitivity to change on the FFMQ in these participants. Given their positive subjective accounts, it is possible that the standardized mindfulness questionnaire simply did not tap into these concepts in a way that was accessible to the participants who may hold different subjective interpretations of test items (Mallinson, 2002). In a recent review of standardized mindfulness questionnaires, although the FFMQ received the highest rating

amongst the ten instruments evaluated, the authors critiqued the lack of content validity of the measure and concluded that it could not be strongly recommended (Park, Reilly-Spong, & Gross, 2013). Therefore, the qualitative data collected following this quantitative study may be more important in determining the embodiment of mindfulness in these participants.

Changes in diabetes self-care behaviors were not significant and effect sizes were generally trivial. Participants reported small effects for increases in blood sugar testing, reductions in the consumption of high-fat foods, and general positive changes to dietary choices. These results are largely consistent with the findings of Rosenzweig et al. (2007) but not with other mindfulness and diabetes researchers who included education on self-care behaviours during their interventions (Gregg, Callaghan, Hayes, & Glenn-Lawson, 2007; Miller, Kristeller, Headings, & Nagaraja, 2013).

The suitability and acceptability of the mindfulness based program for an Aboriginal population was supported by the participants' subjective ratings. Participants indicated that they valued what they learned, were satisfied with the outcome, would recommend it to others in their community, and continued with the practices beyond the end of the program. Additional evidence for the acceptability of the program can be found in the reasonable rate of attrition, which, at 25%, was better than reported rates for mindfulness interventions with minority and inner-city populations (34-40%; Roth & Creaser, 1997 and Roth & Robbins, 2004) and only somewhat higher than those reported for MBI's in general (15%; Vibe, Hammerstrøm, Kowalski, & Bjørndal, 2010). Our attrition rate was comparable to other studies investigating mindfulness interventions for diabetes (e.g., 17% reported by Hartmann, et al., 2012 and 26% by van Son et al., 2013).

It is also important to note that we found no significant differences on baseline measures (demographic, self-report, or biological) between those who completed the program and those who chose not continue with it, which makes it difficult to determine whether any of these variables played a role in attrition.

The primary limitations to this quantitative study were the small sample size and lack of control group, which limit the reliability and generalizability of the results.

Although the study shows clear positive health changes with clinically meaningful effect sizes, the small sample size reduces the reliability of the pairwise comparisons. It also limited my ability to control for potential confounds and precluded a mediation analysis, which could have explored the relationships among stress, mindfulness, and health outcomes. Another limitation is that, unlike the study by Rosenzweig and associates (2007), I did not discard participants' data due to medication changes during the time of the study. That said, in support of my results, I found no statistical association between medication changes and health improvements.

### **Qualitative Study**

With this study, I was interested in gaining an understanding of the acceptability, suitability, and effectiveness of the modified MBI for Aboriginal adults with diabetes. I also was interested in determining the potential for future applications the program in this community and learning ways to increase its viability through the reported experiences of the participants in this study. Overall, it is clear from their responses that the participants enjoyed the program, valued its content, and perceived several benefits from attending. They also expressed the belief that their fellow community members could benefit from the program and, consistent with this reported belief, had recommended the program to

others, were sharing what they had learned, and had requested that the program continue in their communities. Collectively, these responses clearly point to the positive potential of the program for this particular population but participants also offered some useful suggestions to better meet the needs of their community members.

Supporting the suitability of an MBI for Aboriginal people, the participants described holding the program and its practices in positive regard. Many reportedly enjoyed aspects of the program are consistent with what is known to be important for health and wellness programming with Aboriginal people. For example, cultural components such as storytelling and traditional teachings (LeMaster & Connell, 1994; French, 2004; and Young, Reading, Elias, & O'Neil, 2000); the interactive and experiential approach to the teachings (Ringwalt & Bliss, 2006); sharing with group members (Iwasaki, Bartlett, & O'Neil, 2005; Ringwalt & Bliss, 2006); and the perceived compatibility with their spiritual beliefs--both traditional and Christian (Iwasaki, Bartlett, & O'Neil, 2005). Participants also expressed appreciation for the mind/body approach (McCabe, 2007; Renfrey & Dionne, 2001) and the perceived similarity to cultural practices such as sweat lodge ceremonies and sharing circles.

Reported benefits support the perceived effectiveness of MBI programs for this population. Participants described noticing physical and emotional health improvements, positive behaviour change, enhanced well-being, increased self-awareness and self-acceptance, and improved interpersonal relations. Some explained that increased self-awareness led to insight into other problems and generated motivation to address them.

Although all participants reported satisfaction with the program, some made suggestions for increasing attendance and facilitating benefits for participants in future

programs. Interestingly, participants were not consistent in their reported personal preferences for teachings, practices, cultural adaptations, group size, and session time or place, so no clear modifications to the program itself are supported. Several participants expressed an initial difficulty with understanding the purpose of the practices and how they related to improvements in health and wellness, however. Normalizing this difficulty in understanding for future participants may help reduce the initial doubt, confusion, frustration, and self-criticism that can arise. Future participants might benefit from an additional emphasis on the process of experiential learning and the explanation that benefits do not come from an intellectual understanding but through repeated practice. Sharing feedback from previous participants regarding how long it takes to ‘get it’ and encouraging future participants to make a short-term commitment to the program before deciding on its efficacy also may help ensure the program’s success. As requested by several of the participants, an additional consideration for change would be to freely offer re-registration for those wishing to continue with the program so that those who take longer to see benefits can continue to learn and those who enjoy the program can remain involved. Offering maintenance sessions for program completers might be another way to enhance and maintain the benefits of the program. The participants also made suggestions for maintaining the accessibility of the program’s language. These are in line with recommendations by researchers interested in cultural tailoring for Aboriginal people, who state that language, in both spoken and written materials, must remain accessible to those with English as a second language or with lower levels of educational attainment (Ringwalt & Bliss, 2006).

Somewhat surprisingly, the participants involved in my study indicated that it was not important for them to have a program instructor of Aboriginal descent. I wondered if social desirability bias played a role in this assertion given that I, their program instructor and interviewer, was not of Aboriginal descent. While this bias is possible, the fact remains that they did take part in the program with me as their instructor. Their reported lack of personal preference in this regard, therefore, seems valid. Their indication that others in their communities would consider it important for program instructors to be Aboriginal or to have ties to the Aboriginal community is also likely valid, and may help to explain the difficulties I had with recruitment. The participants were clear about wanting an instructor who was compassionate, genuine, non-judgmental, and sensitive to the concerns of Aboriginal people and, for this particular group of people, having an instructor of Aboriginal descent appeared less important than these characteristics. It is important to recognize that instructor race/ethnicity may not have mattered for the current group of participants, but may have been a deterrent for participation for some potential participants.

As already mentioned, recruiting participants for the MBI program was quite difficult. Based on previous reports of recruitment challenges with indigenous populations (Hodge, Weinmann, & Roubideaux, 2000), I expected some difficulty with this aspect of my research. I had erroneously thought, however, that since Aboriginal peoples make up approximately 17% of the population in Manitoba (Statistics Canada, 2011), and that a significant number of these people would have a diagnosis of diabetes, the participant pool was large enough to offset the expected difficulties. Although the recruitment difficulties I encountered could be interpreted as evidence against the



suitability of an MBI in this population, it is more likely that factors unrelated to the program itself were responsible for the seemingly low interest in participation.

Participants' reports of barriers to attendance, both for themselves and other community members, were consistent with those cited by other researchers studying indigenous populations such as self-exclusion due to lack of resources (time, transportation, child-care); valuing privacy; and managing the burden of poor health, low income, and other daily stressors that often come from being part of a marginalized community (Hodge, Weinmann, & Roubideaux, 2000). Despite these barriers, the participants indicated that they enjoyed the program, valued what they had learned, and experienced significant health benefits, all of which speaks to the potential of the program within the population despite these difficulties.

Another factor identified as a major contributor to recruitment difficulties with indigenous people is a cultural history of negative experiences with researchers that includes lack of community consultation, disrespect for their culture, minimal communication about the research, lack of informed consent, and no ultimate benefit to the community (Hodge, Weinmann, & Roubideaux, 2000). Consistent with this reported finding, participants highlighted trust as vital to the acceptance of programs in their community and talked about the need for trust in the researchers and program instructors prior to their own involvement in the study. In fact, the issue of trust was a thread throughout several of the themes and categories identified in the participant interviews. The importance of trust was referred to when discussing their initial and ongoing participation that required a trusted referral source or sufficient trust in the researchers and instructors, in the difficulty with speaking and sharing in the group, in the location of

the sessions, and in themselves with respect to their ability to understand the teachings and benefit from the practices. To address trust needs within their communities, participants emphasized the importance of endorsement from fellow community members and their reported tendency to make unsolicited recommendations to family and other community members speaks to the potential future success of the program. Referrals by health care professionals were also identified as meeting the need for trust in some participants.

Once interest in the program has grown through sufficient trust and through increasing evidence for the program's benefits, for the program to be effective, participants emphasized that it must remain available to people in their communities. To be sustainable, the program should address as many barriers to participation as possible. For example, it should be low- or no-cost to participants; take place in a convenient, familiar, and easily accessible location; and, whenever possible, provisions should be made for child-care and transportation needs. Instructors must be knowledgeable about mindfulness practices with appropriate training in delivering MBI's and, if not Aboriginal, are at a minimum compassionate and sensitive to Aboriginal concerns.

While I took great care to ensure the trustworthiness of the data, there were some limitations to this study. As is common in qualitative research, the small sample from a limited geographic area does not allow for the transferability of the results to other Aboriginal or indigenous communities. Further studies are needed to ensure the suitability of MBI's in other communities. Also, I interviewed completers of the program only, which may have prevented identifying further barriers to participation. Interviewing people who called to inquire about the program but chose not to participant

and those who dropped out may have added unique information about the potential suitability of the program in this population. Common to qualitative research, another limitation of this study lies in the fact that the reported health improvements are susceptible to reporting biases. The quantitative results reported earlier, however, add important objective evidence and provide support for the participants' claims of health benefits.

### **Mixed Methods: Integration**

As outlined above, the quantitative and qualitative findings offer unique perspectives into the feasibility of an MBI in Aboriginal adults with T2DM, with both providing support for its effectiveness and suitability within the population. The strengths of each method balance the limitations of the other and, considered together, the evidence is compelling.

The overall validity of the mixed methods approach is best determined by triangulation of the data (Creswell, 2009). When the quantitative results, which consist of objective, biological data as well as subjective, self-report questionnaire ratings and brief hand-written answers are considered with the qualitative results (including participant verification of the findings), the combined evidence points to the feasibility of the program in the population studied, and strengthens the validity of our findings. Further exploration of the combined strength of the results follows.

The quantitative results indicate some statistically significant improvements in important, objective health measures, which provides some evidence for the effectiveness of the program. The small sample size does limit the validity of these promising results, however. The medium to large effect sizes on several other health measures provide

additional evidence for the effectiveness of the program in this population and the subjective reports of improved health and well-being in the qualitative findings increase confidence in the clinical significance of these results. In addition, the qualitative data captures aspects of health and well-being that were not queried on the standardized questionnaires used in the quantitative study. The interviews revealed such improvements as healthier coping methods (and reductions in maladaptive coping), increased awareness that lead to enhanced self-care, shifts to more positive attitudes, calmer dispositions, improved relationships, and increased emotion management.

Somewhat surprisingly, the self-report questionnaires used in the quantitative study did not reveal significant changes in mindfulness or diabetes self-care activities; nor were there large effect sizes to clearly indicate clinically important change. It was interesting to note, then, that participants reported positive changes on both these variables in their own written words at post-intervention and follow-up quantitative data collection periods as well as during the qualitative interviews.

The lack of significant or sizeable change on standardized questionnaire data may be explained by the fact that none of the self-report measures used in my study have been normed in indigenous populations and, therefore, may lack validity for the participants in my study. Cultural, language, and educational differences may have affected the validity and reliability of the measures and important changes may have been missed as a result. For this reason, the qualitative responses add particular value to this research endeavor.

With regard to the acceptability and suitability of the program, the program satisfaction and follow-up questionnaires of the quantitative study strongly indicate an appreciation for the program and its practices. Participants indicated that they enjoyed

the program, valued the learning and outcomes, and were continuing to use the practices. The qualitative data fully supported and expanded upon these findings. For example, all participants expressed positive regard for the program and the perceived value of the program can be inferred by their requests for the continuation of the program and their reported recommendations of the program to others. In addition, the finding that participants felt the program was compatible with their spiritual beliefs, whether traditional or Christian, was not captured in the quantitative study and provides strong support for the suitability of the program in this population. It is not entirely clear whether the cultural adaptations added to the positive experience of the program but the subjective accounts of appreciation for them provide some evidence for their inclusion. This is certainly a reasonable question for further empirical study.

The difficulties with recruitment, as outlined above, could represent evidence against the acceptability and suitability of the program in this community but I have argued that the recruitment difficulties were not a function of the program itself, but rather of issues related to being part of a marginalized community, one with a history of cultural disrespect by researchers. The qualitative data elucidate the barriers to participation, which are largely consistent with the reasons cited by those who chose not to participate in the program/study and support the extant literature regarding challenges to recruitment with indigenous populations (Hodge, Weinmann, & Roubideaux, 2000; Sibthorpe, et al., 2002).

## **Conclusions**

The overall results of this mixed methods study support the use of mindfulness-based interventions as an effective, acceptable alternative for some Aboriginal people,

which is a promising result given the health disparities faced by Canadian Aboriginal people. The clinically important health changes for these participants with diabetes is particularly encouraging since the already disproportionate rate of diabetes in this population is growing rapidly.

Future studies may expand on these findings with more rigorous research designs and larger sample sizes. It may become useful to target other indigenous communities and populations to assess generalization as well. Both quantitative and qualitative studies would assist with investigating the efficacy and acceptability of MBI's in this previously overlooked segment of the population. As my results confirm, trust is a crucial factor when working with indigenous peoples and time spent building relationships prior to recruitment efforts would be highly beneficial. Including leaders and general members of the Aboriginal community in the planning and implementation of the studies is also strongly advised (French, 2004; Thompson, Gifford, & Thorpe, 2000; White, Smith, & O'Dowd, 2005).

Further empirical inquiry into the usefulness and suitability of MBIs in Aboriginal communities is important and meaningful and I believe this study provides sufficient evidence for the feasibility of larger trials. Training members of the Aboriginal community to run the programs independently will likely serve to encourage participation and may help to ensure the success of future studies. This also would allow for further appropriate modifications to the program to suit each community. An additional research question that may be considered is whether cultural modifications are necessary and, if so, what are the benefits and advantages of a culturally adapted program versus a standard MBI.

There are many empirically supported MBIs for other health concerns and, considering these preliminary positive outcomes for diabetes, it also may be beneficial to begin investigating the feasibility of this modified MBI for other concerns common to the often marginalized indigenous people. One recent study investigated the feasibility of an MBI for suicide prevention in Native American youth, with positive results (Le & Gobert, 2013) and others report that MBIs enhance spiritual pursuits in indigenous people, whether those pursuits are traditional or Christian (Duran, Fox-Davis, & Allione, 2008). I suspect that, with appropriate modifications, MBIs targeting depression (Segal, Williams, & Teasdale, 2002), trauma (Follette, Palm, & Pearson, 2006), pain (Hayes, Strosahl, & Wilson, 1999), stress (Kabat-Zinn, 1990), and addictions (Witkiewitz, Marlatt, & Walker, 2005) would be equally beneficial and, if so, may enable the reduction of health disparities in this disadvantaged segment of the population.

In sum, diabetes rates are growing exponentially in recent years and indigenous populations appear to be particularly at risk. In Canada, the Aboriginal population is growing approximately four times faster than the national average (Statistics Canada, 2011) and the health disparity between Aboriginal and non-Aboriginal people is increasing (Rock, 2003), creating the time-sensitive need for effective and culturally appropriate treatments.

Although other, more conventional psychological interventions such as cognitive behaviour therapy or psychodynamic therapy show positive results for glycemic control in diabetes patients (Ismail, Winkley, & Rabe-Hesketh, 2004), mindfulness interventions appear to be a particularly good approach since they target stress-reactivity, which can exert both direct (via stress hormones) and indirect (via behaviour) effects on blood sugar

levels (Peyrot, McMurray, & Kruger, 1999). In addition, mindfulness interventions may be particularly suited to Aboriginal populations due to their emphasis on a mind-body approach and the importance of sharing, equality, introspection, and taking lessons from daily living, which are central to Aboriginal traditions (Gone, 2009; McCabe, 2007).

The Aboriginal participants in my study experienced significant and important health improvements following participation in the modified MBI. They also reported finding the intervention enjoyable, suitable, and useful. If these results are supported and extended with further research, we may be in a position to provide an acceptable, cost-effective treatment for this historically underserved population and begin to reduce the health disparity and improve the lives of many Canadians.



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## Appendix A



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## STUDY DESCRIPTION AND CONSENT FORM

**Title of Study:** Mindfulness-Based Stress Reduction for Aboriginal Canadians with Diabetes

**Researcher:** Lisa Dreger, Graduate Student (PhD), Department of Psychology, University of Manitoba

**Research Supervisor:** Dr. Corey Mackenzie, Assistant Professor, Department of Psychology, University of Manitoba

This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

We invite you to take part in a study that will examine health outcomes of a mindfulness-based stress reduction program for Aboriginal peoples with Type 2 Diabetes Mellitus. This study is being conducted as Lisa Dreger's doctoral thesis under the supervision of Dr. Mackenzie. Please take your time to review this consent form and feel free to discuss any questions you may have either with Lisa Dreger or with Dr. Mackenzie. We can be reached at (204) 474-9196.

**What is this study about?** The purpose of this study is to investigate whether a modified version of Mindfulness-Based Stress Reduction (a meditation based program adapted in consultation with an Aboriginal Cultural Advisor) will result in health benefits for Aboriginal peoples with Type 2 Diabetes.

**What will I do and how much time is needed?** If you agree to participate in the study, you will be invited to take part in an 8-week mindfulness based stress reduction program. Participants will be asked to provide basic demographic information (age, gender, Aboriginal status, level of education, employment status, household income, duration of diabetes, and medication status (current type and amount of medication)). In addition, you will be asked a number of questions related to your physical and emotional health, including your current level of stress, health behaviours, and your experience with and awareness of daily living activities. It will be your choice whether you answer the questions in a face-to-face interview with study staff or by filling out paper and pencil questionnaires (with study staff available to assist with any questions or concerns you may have). We will also measure your blood sugar levels, blood pressure, and height and weight. Blood will be collected using a finger prick, similar to the type of lancet used for daily blood glucose testing. You will be asked to pierce your own finger with the lancet and a

research assistant will carry out the blood analysis using a portable A1C device. All of these measures will be collected three times during the study; at the beginning of the study, immediately following the 8-week program, and then 3 months after the program ends. Each information collection session is expected to last between 45 and 60 minutes. These sessions will take place at Thunderbird House which is located on Main St. (at Higgins).

In addition to the three information collection sessions, you will be asked to participate in an 8-session, group stress management program (co-instructed by Lisa Dreger and Brian McLeod who is an Aboriginal Cultural Advisor). This program will consist of 8 weekly sessions (seven 2-hour sessions plus one 4-hour session). The sessions are planned for Wednesday evenings from 5-7. The longer, 4-hour session will also take place on a Wednesday, from 5-9 pm, and will include a meal. As with the three information collection appointments, the program is planned to take place at Thunderbird House in Winnipeg. The treatment sessions will involve a number of different guided mindfulness practices (gentle movement, walking, sitting, and lying down), traditional teachings (teachings on the four elements, traditional story-telling, law of relationship) and group sharing (sharing of experiences with the practices and of life difficulties, but only on a voluntary basis). You will also be asked to practice the learned activities at home for 20-minutes per day, 5 days per week (assigned each week). To assist with the home practice, CD's with guided instructions for the activities will be provided for you to follow. Upon completion of the program, we will ask you some questions about your experience in the program; what you liked, what you didn't like, and whether you found it helpful.

**Is it confidential?** Yes. For all of the information collected, you will be identified only by an ID number. Your information will be stored on a computer in Dr. Mackenzie's research lab at the University of Manitoba. Only the researchers in Dr. Mackenzie's lab will have access to the data. The master list which links your name with your information will be kept in a separate secure location in the lab. For additional security, all completed questionnaires will be kept in a separate location from the signed consent forms. In addition, intervention participants will be asked to respect the confidentiality of each person in the group by not revealing any information about who they see or what is said in the group to anyone outside of the group. Information gathered during this study may be published or presented in public forums but your name and other identifying information will not be used or revealed. Five years after the completion of the study, all data will be destroyed (expected to occur August, 2016).

**Are there any potential risks for me?** There are few risks associated with this study. There may be some minor pain from the finger prick required for blood glucose testing (slightly more blood is required for the A1C test planned than you normally need for your daily blood sugar tests) and there is the possibility of some discomfort arising out of the personal nature of some of the questionnaire items (which you can choose not to answer). In addition, the mindfulness-based program encourages people to bring awareness to their present-moment experience, which, at times, may be uncomfortable. Another potential risk is the experience of disappointment, which may occur if you are assigned to the control group instead of the treatment group. And, finally, although the participants in the treatment group will be asked to honour the confidentiality of all other group participants, there is the possibility that some of the information shared in the group will not remain confidential.

**Are there any potential benefits for me?** Benefits may be seen both directly (personal health) and indirectly (community health). There is the possibility for meaningful health improvements. Previous research has shown that participation in the Mindfulness-Based Stress Reduction program is associated with a number of physical and emotional health benefits, including improved blood sugar control for individuals with diabetes. In addition, study participation will



assist in evaluating a program which has the potential to improve the health of fellow community members.

**If I start the study, can I quit?** Yes. Your decision to take part in this study is voluntary. You are free to withdraw from the study at any time. You may also refrain from answering any questions that you prefer to omit, without prejudice or consequence.

**Will I receive payment for participation?** No. You will not receive payment for participating in this study but you will be provided with bus tickets to attend each session. Refreshments will also be provided at each session.

**Who should I talk to if I have questions, or if I want to withdraw from the study?** You may talk directly with the researcher, Lisa Dreger (470-2083) or with her research supervisor, Dr. Corey Mackenzie (474-9196) about the experiment. If you would like more detail about anything mentioned here, or information not included here, you should feel free to ask. You may also talk to any of the study assistants throughout your participation in the study.

**Has this study been reviewed for acceptability?** Yes. This research project has been designed in collaboration with Aboriginal leaders and will continue to be monitored for cultural relevance and acceptability throughout the study. This research has been approved by the Psychology and Sociology Research Ethics Board (PSRED) at the University of Manitoba. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Secretariat at 474-7122. A copy of this consent form has been given to you to keep for your records and reference.

**Can I find out about the results of the experiment?** Yes. At the end of the study (expected to be during the summer of 2011), you will be provided with a written report of the final results. The report will be mailed out to you and included in the letter will be an invitation to attend a community presentation on the results of the study.

**How do I agree to participate in this study?** Simply sign this consent form. Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

You will receive a copy of this consent form.

\_\_\_\_\_  
Participant Name

\_\_\_\_\_  
Participant Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
*Researcher/Delegate Name*

\_\_\_\_\_  
*Researcher/Delegate Signature*

\_\_\_\_\_  
*Date*

## Appendix B



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 Winnipeg, Manitoba, Canada R3T 2N2

### STUDY DESCRIPTION AND CONSENT FORM

**Title of Study:** Mindfulness-Based Stress Reduction for Aboriginal Canadians with Diabetes.  
 Part 2: A Qualitative Interview

**Researcher:** Lisa Dreger, Graduate Student (PhD), Department of Psychology, University of Manitoba

**Research Supervisor:** Dr. Corey Mackenzie, Assistant Professor, Department of Psychology, University of Manitoba

This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

We invite you to take part in a second part of the study aimed at understanding the experiences of the participants in the mindfulness-based stress reduction program modified for Aboriginal adults with Type 2 Diabetes Mellitus. This study is being conducted as Lisa Dreger's doctoral thesis under the supervision of Dr. Mackenzie. Please take your time to review this consent form and feel free to discuss any questions you may have either with Lisa Dreger or with Dr. Mackenzie. We can be reached at (204) 474-9196.

**What is this study about?** The purpose of this study is to explore participants' views on a modified version of Mindfulness-Based Stress Reduction. We are interested in participants' opinions about the program and the factors surrounding their involvement in it. This information will be used to develop a better understanding of the suitability and perceived efficacy of the program for Aboriginal adults with diabetes and will assist with future modifications of the program to better serve the community.

**What will I do and how much time is needed?** If you agree to participate in the study, you will be invited to take part in a one-on-one interview with the researcher, Lisa Dreger, about your experience with the program. The interview will take approximately one hour to 90 minutes to complete. An audio recording device will be used so that the interview can be typed into a file. The meeting will take place at a mutually agreed upon location that is comfortable and familiar and that supports your privacy during the interview.

**Is it confidential?** Yes. The information from the interview will be recorded using an audio recording device. This recording and the information provided in the interview will be kept anonymous (you will be identified only by an ID number). Your information will be stored on a password-protected computer in Dr. Mackenzie's research lab at the University of Manitoba.

Only the researchers in Dr. Mackenzie's lab will have access to the data. The master list which links your name with your information will be kept in a separate secure location in the lab. For additional security, any written information from the interview will be kept confidential and will be stored in a separate location. Access to this information will be available only to members of Dr. MacKenzie's lab. Information gathered during this study may be published or presented in public forums but your name and other identifying information will never be used or revealed. Five years after the completion of the study, all data will be destroyed.

**Are there any potential risks for me?** There are no known risks associated with this part of the study. If you agree to participate in this study, one hour to 90 minutes of your time will be required to complete the interview.

**Are there any potential benefits for me?** There are no direct personal benefits for you in taking part in this portion of the study. We hope that, with the sharing of your experience, we will better understand the value of participation in the MBSR program and gain information on how to improve the content and delivery of the program for an Aboriginal adult population with diabetes. This knowledge would be of benefit to fellow community members.

**If I agree to take part in the study, can I quit?** Yes. Your decision to take part in this study is entirely voluntary. You are free to refrain from answering any questions that you prefer to omit, without prejudice or consequence.

**Will I receive payment for participation?** No. You will not receive payment for participating in this study but, if required, you will be provided with bus tickets to attend the session. Refreshments will also be provided for you.

**Who should I talk to if I have questions, or if I want to withdraw from the study?** You may talk directly with the researcher, Lisa Dreger (470-2083) or with her research supervisor, Dr. Corey Mackenzie (474-9196) about the Study. If you would like more detail about anything mentioned here, or information not included here, you should feel free to ask. You may also talk to any of the study assistants throughout your participation in the study.

**Has this study been reviewed for acceptability?** Yes. This research project has been designed in collaboration with Aboriginal leaders and will continue to be monitored for cultural relevance and acceptability throughout the study. This research has been approved by the Psychology and Sociology Research Ethics Board (PSRED) at the University of Manitoba. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Secretariat at 474-7122. A copy of this consent form has been given to you to keep for your records and reference.

**Can I find out about the results of the experiment?** Yes. At the end of the study, you will be provided with a written report of the final results. The report will be mailed out to you and included in the letter will be a questionnaire for your feedback on the results of the study.

**How do I agree to participate in this study?** Simply sign this consent form. Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence.

Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

You will receive a copy of this consent form.

\_\_\_\_\_  
Participant Name

\_\_\_\_\_  
Participant Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
*Researcher/Delegate Name*

\_\_\_\_\_  
*Researcher/Delegate Signature*

\_\_\_\_\_  
*Date*