Aboriginal Health Issues and the Benefits of the Exercise:

The Red Fox Adult Fitness Program

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INTRODUCTION

This article provides a summary of health issues recognized in the literature as relevant to aboriginal people but this article does not provide practice guidelines. The terms 'native' and 'aboriginal' is used interchangeably in this article to refer to people whose ancestors were indigenous to Canada (MacMillan, H. L., MacMillan, A. B., Offord, D. R., & Dingle, J. L., 1996). It has been shown that Canadian aboriginal people die earlier than their fellow Canadians on average, and sustain a disproportionate share of the burden of physical disease and mental illness (MacMillan *et al.*, 1996). Improving the health of Canada's native people will depend on improving their economic and social conditions as well as assisting native people to identify and address their own health needs (MacMillan *et al.*, 1996). This paper examines how the Red Fox Adult program provides health benefits to the Aboriginal community in the Downtown Eastside of Vancouver.

I: GENERAL BENEFITS OF EXERCISE

The physical, mental and social benefits of exercise have been well-documented. In fact, to obtain the health benefits one only needs to exercise at a moderate intensity (such as brisk walking) as little as 30 minutes, 5 times a week (Haskel, *et al.*, 2007).

The physical benefits of exercise are numerous, and affect multiple body systems. The most obvious benefit is the decreased body fat and increased lean body tissue (Sidney *et al.,* 1977). However, physical exercise has benefits far beyond body composition; it has been shown that there is a direct relationship between physical inactivity and cardiovascular mortality, and that physical inactivity in itself is an independent risk factor for the development of coronary artery disease (Powell, *et al*., 1987, Morris, *et al*., 1990, Blair, *et al.,* 1989). Similarly, expending 700-2000 kcal a week through exercise is related to lower all-cause mortality and cardiovascular

disease (Lee*, et al*., 1995, Blair, *et al*., 1995). Regular exercise is also correlated with increased longevity (Yates, *et al.,* 2008, Paffenbarger, *et al.,* 1986). The reduction in cardiovascular disease may be related to the fact that aerobic exercise adds an independent blood pressure–lowering effect in certain hypertensive groups with a decrease of 8 to 10 mm Hg in both systolic and diastolic blood pressure measurements (Hagberg, *et al.,* 1989, Jennings, *et al.,* 1989, Braith, *et al.*, 1994). It also reduces the risk for atherosclerosis, which may be due to reduction in triacylglycerol levels, low-density lipoproteins (bad cholesterol), and an increase in high-density lipoprotein (good cholesterol) (Edwards*, et al*., 2009, Rood, *et al.,* 2008). Exercise also benefits the musculoskeletal system; load bearing activities increase bone density and thereby also decrease the risk for osteoporosis (Smith*, et al.,* 1976). Furthermore, along with increasing muscle hypertrophy and strength, strength training also decreases muscle wasting, known as sarcopenia (Taffe, 2006).

Aside from the physical benefits of exercise, there are also numerous mental benefits. Individuals who exercise regularly tend to be better adjusted and perform better on tests of cognitive functioning (Eysenck, *et al.,* 1982, Spirduso, et al., 1980). They also exhibit reduced cardiovascular responses to stress (Crews, *et al*., 1987). In terms of psychological health, active individuals report fewer symptoms of anxiety and depression as well as improved self-confidence and self-esteem (Lobstein, *et al.,* 1983, Folkins and Sime, 1981). In day to day living, exercise participation results in better mood and functional capacity, as well as improved motivation (Penedo, *et al.,* 2005, Ntoumanis and Biddle, 1991). For both males and females, sport participation has been shown to protect against hopelessness, suicidal ideation (Taliaferro, 2008).

Lastly, while it is somewhat more difficult to measure in clinical research, there are many social benefits. Participating in exercise classes can be an opportunity to meet new people and develop new relationships. This may be a factor in studies which have found that those who engage in exercise tend to have a higher quality of life (Penedo *et al*, 2005, Shephard, 1993). Furthermore, participation in-group exercise, such as team sports or working out with a friend can help an individual adhere to an exercise program. A study by Kent and associates (2010) found that social support (family, friends, support groups, etc.) is a factor that may dictate whether a person continues with an exercise program or abandons it.

II: RED FOX ADULT EXERCISE PROGRAM

Red Fox organizes an adult exercise program once a week. A certified personal trainer facilitates the adult exercise program. The group travels to a different community centre in the Vancouver area each week. Depending on the weather and the season, it can take place indoors or outdoors. The program design is individually based; each participant has unique fitness levels, abilities, limitations and preferences. Goals are self-referenced and focused on improving on the previous session's progress.

The types of activities are limited by what is available at each fitness centre. The main components into which each workout is broken are: cardiovascular exercise, resistance training, balance exercises and flexibility (or stretching). Cardiovascular exercise is available most often on machines such as the treadmill for those who are able. The exercise bike is also commonly available in most centres and is a safer option for those who have balance issues. Resistance training is available in the form of both free weights and machines, and both are utilized depending on the specific exercises the individual is performing. Balance and flexibility exercises are performed on exercise mats.

The program, aside from providing physical fitness training also has a large social emphasis. It is an opportunity to explore different communities and engage in new experiences. Also, each session ends with a group talk with the personal trainer to review what they enjoyed and disliked about that particular session, and their thoughts and emotional responses to the experience. This feedback helps the program to continually improve and adapt to the needs of the participants, as well as to identify the barriers to participation, which must be addressed.

III: ABORIGINAL HEALTH ISSUES

Obesity.

Obesity is a chronic disease associated with disability and discrimination. According to Katzmarzyk (2002), obesity is a condition of excessive body fat that results from a chronic energy imbalance whereby intake exceeds expenditure. A positive energy balance is created by several factors in current Western society including increased availability of lower-cost foods, decreased physical activity, and increased in portion sizes (Murdy and Ehrman, 2009). Adults are considered to be overweight if their body mass index (BMI) is 25 kg/m^2 or greater, and are obese if their BMI is 30 kg/m^2 or greater (Tremblay, Katzmarzyk, and Willms, 2002). Excess body fat increases an individual's risk of premature death from chronic diseases such as coronary heart disease, stroke, type II diabetes mellitus, gall bladder disease and some cancers (Katzmarzyk, 2002). Obesity often begins in early childhood and early adolescence but majority of all obesity begins in adulthood (Murdy *et al.*, 2009).

Recently, it has been shown that the percentage of Canadian adults with excess weight has increased considerably (Shields and Tjepkema, 2006). A self-reported survey conducted in 2003 by the Canadian Community Health Service (CCHS) reported one-third (33.3%) of adults (≥18 years) were classified as overweight, with 41.0% of men and 25.7% of women categorized

in this category (Belanger-Darcharme and Tremblay, 2004). In addition, CCHS determine According to Health Canada, many factors have contributed to the increasing rates of overweight and obese individuals. Changes in society, work and leisure have affected activity and eating patterns, which have lead to a rise in obesity. Evidence suggests that the prevalence of obesity varies by ethnicity (Tremblay, Perez, Ardern, Bryan, and Katzmarzyk, 2005). The prevalence of overweight and obesity is much higher among Aboriginal people than among the rest of the population (Garriguet, 2008). At 26%, the prevalence of obesity exceeds by nearly 11% the Canadian average for adults ≥18 years (Belanger-Ducharme *et al.,* 2004). Increases in obesity have coincided with an increased susceptibility for metabolic disorders, even in very young Aboriginal children (Dean, 1998). Physical activity programs, when implemented, will decrease the number of obese Aboriginals. According to Katzmarzyk (2004), in both youth and adults, physical inactivity was associated with increased incidence of obesity.

Physical inactivity and obesity represent two of the greatest threats to public health in Canada (Katzmarzyk and Janssen, 2004). The total direct cost of obesity accounted for $1.8 billion, or approximately 2.4% of the total direct health care expenditures in 1997 (Birmingham, Muller, Palepu, Spinelli, and Anis, 1999). In accordance with Katzmarkyk and colleagues (2004), physical inactivity accounted for $2.1 billion, or 2.5% of the total direct health care expenditures in Canada. However, estimates did not include indirect costs of inactivity so the total impact of physical inactivity on the Canadian economy is unknown (Katzymarkyk *et al.,* 2004). Results show that physical inactivity and obesity are major contributors to the public health burden in Canada and provide compelling evidence to reduce physical inactivity and obesity. This will substantially reduce health care spending (Katzymarkyk *et al.,* 2004).

Obesity and sedentary lifestyle is considered the second-leading cause of preventable death (the first being tobacco use) (Murdy *et al.,* 2009). Obesity in adulthood is associated with a decrease in life expectancy of about 7 years in both men and women with 70 being the life expectancy of most individuals (Peeters, Barendregt, Willekens, Mackenbach, Mamun, and Bonneux, 2003). As stated by Lix and colleagues (2009), the differences in the prevalence of behavioral risk factors and chronic conditions between Aboriginal and non-Aboriginal populations may be associated with a number of circumstances and characteristics, including access to and use of health services; knowledge, attitudes, and beliefs about health, social determinants, and genetic disposition. Listed below are a few complications that are often associated with obesity:

Type II diabetes. Type II diabetes mellitus is strongly associated with obesity (almost 80% of all cases are weight related) (Murdy *et al.,* 2009). Insulin resistance characterizes this type of diabetes. This means that the body cannot efficiently utilize insulin in the muscle or liver even though sufficient insulin is being produce. A more extensive examination on diabetes will be described later on in this paper.

Hypertension. Hypertension is defined as a transitory or sustained elevation of systemic blood pressure to a level that may induce cardiovascular damage or result in other adverse consequences (Contractor & Gordon, 2009). According to Murdy and colleagues, hypertension often increases in obese people and a 10 kg weight loss can reduce blood pressure by 10 mmHg (Murdy *et al.,* 2009).

Cardiovascular disease (CVD). Cardiovascular morbidity and mortality is greater in obese individuals, and the role of fatty tissue is becoming more clearly established as a key coronary heart disease risk factor (Murdy *et al.,* 2009). High levels of low density lipoproteins (LDL) and

low levels high density lipoproteins may also play a role in CVD. Heart failure increases two-fold in obese individuals (Murdy *et al.,* 2009).

Respiratory illness. Obesity is related to dyspnea (shortness of breath or difficulty breathing at rest or exertion) and asthma, and is seen as the greatest predictor of sleep apnea, a syndrome of interrupted sleep with snoring and apneic periods that lowers oxygen saturation levels that are associated with potentially lethal ventricular arrhythmias (Murdy *et al.,* 2009).

Metabolic syndrome. The metabolic syndrome is a term for a group of metabolic abnormalities associated with risk of coronary heart disease, stroke, and cardiovascular mortality greater than that of its individual components (Kaler, Ralph-Campbell, Pohar, King, Laboucan and Toth, 2006). This syndrome is often defined by four risk factors: abdominal obesity, elevated blood pressure and glucose levels, and dyslipidemia (low levels of HDL cholesterol and elevated triglycerides) (Donley, 2009). Metabolic syndrome is primarily seen in overweight and obese individuals.

Diabetes Mellitus.

Diabetes mellitus describes a metabolic disorder of multiple etiologies, characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both (Albert and Zimmet, 1998). Diabetes mellitus symptoms are characterized by thirst, polyuria (production of abnormally large volumes of dilute urine), blurred vision, and weight loss (Alberti *et al.* 1998). The severe symptoms (ketoacidosis or a non-ketotic hyperosmolar) may lead to a state of unconsciousness, coma and may be fatal. Long-term effects of diabetes mellitus include progressive development of retinopathy with potential blindness, nephropathy, increased risk of foot ulcers, amputation, and some autonomic dysfunction (Alberti *et al.,* 1998). Individuals with diabetes are at increased risk

of cardiovascular, peripheral vascular and cerebrovascular disease (Alberti *et al.,* 1998). Insulin is required by muscle, fat, and the liver to utilize glucose (Albright, 2009). Although no cure exists, diabetes and its complications can be prevented, delayed, and managed by identifying risk factors and detecting the condition at an early stage. There are several types of Diabetes:

Type I diabetes. Type I denotes the processes of beta-cell destruction in the pancreas that may lead to diabetes mellitus in which 'insulin is required for survival' to prevent the development of ketoacidosis, coma, and death (Alberti, 1998).

Type II diabetes. Type II is the most common form of diabetes mellitus (Alberti *et al.,* 1998). Type II is characterized by insulin resistance of the peripheral tissues and defective insulin secretion (Albright, 2009). With this resistance, the body is unable to effectively use insulin in the muscle or live even though insulin is being produced (Albright, 2009).

Diabetes and its complications are major contributors to morbidity and mortality among Canada's Aboriginal populations (Bruce, 2000). The occurrence of type II diabetes among Canadian Aboriginal people is far greater than the national average and has reached alarming rates (Bruce, 2000). The prevalence of diabetes among Aboriginal Canadians is 3-5 times higher than non-Aboriginal Canadians (Young, Reading, Elias, & O'Neil, 2000). Diabetes mellitus was considered rare among Aboriginal people until the 1940s, but since then the prevalence of non-insulin-dependent diabetes mellitus (NIDDM) has increased greatly in many communities (Young, Schraer, Shubinkoff, Szathmary, and Nikitin, 1992).

The acute complications of diabetes are hyperglycemia (high blood sugar) and hypoglycemia (low blood sugar) (Albright, 2009). Hyperglycemia is associated with uncontrolled diabetes, as indicated by glucose levels that are frequently above the patient's glycemic goals. High blood glucose causes the kidneys to excrete glucose and water, which

causes increased urination and dehydration (Albright, 2009). If hyperglycemia continues unchecked it can lead to diabetic ketoacidosis (Albright, 2009). When insulin is not present in the body, the body is unable to utilize glucose effectively; this causes the body to turn to other sources for energy (Albright, 2009). Fat metabolism occurs to provide necessary energy. Ketones, which are a by-product of fat metabolism, can cause an increased risk of coma and death (Albright, 2009). Ketoacidosis symptoms include abdominal pain, nausea, vomiting, rapid or deep breathing, and sweet- or fruity-smelling breath (Albright, 2009). This syndrome usually results in severe hydration attributable to rising blood glucose levels, resulting in excessive urination. This excessive loss of water, known as hyperosmolar non-ketotic syndrome, eventually leads to decreased cognitive ability and possible coma (Albright, 2009). In the case of hypoglycemia, as blood glucose levels decrease, glucagon, epinephrine, growth hormone, and cortisol are released to help increase circulating glucose (Albright, 2009). Hypoglycemia symptoms fall into two categories; autonomic (shakiness, weakness, sweating, nervousness, anxiety, tingly of the mouth and fingers, and hunger) and neuroglycopenic (headache, visual disturbances, mental dullness, confusion, amnesia, seizures and coma) (Albright, 2009).

The chronic complications of diabetes are categorized into three categories. The first is macrovascular disease in which the blood vessels of the heart, brain, and lower extremities can be affected (Albright, 2009). Blockages of the blood vessels in the legs results in peripheral artery disease, intermittent claudication (limping due to pain), and exercise intolerance (Albright, 2009). The second category is microvascular disease. This complication causes retinopathy and nephropathy, which causes abnormal functioning and damage to small vessels of the eyes and kidneys. Retinopathy can ultimately cause blindness, while nephropathy can cause renal failure. Finally, the last category is neuropathy, which involves the cranial nerves or the peripheral or

autonomic nervous system (Ehrman, Gordon, Visich, & Keteyian, 2009). Patients usually experience sensory symptoms (paresthesia, burning sensations, and hyperesthesia) and loss of tendon reflexes (Albright, 2009). As neuropathy progresses, feet become numb and may require amputation because of loss of sensation.

Fetal Alcohol Syndrome.

Fetal Alcohol Syndrome (FAS) is an increasingly prevalent health issue in the Native American population. It is the most commonly known cause of mental retardation in the USA and Europe (Burd and Moffatt, 1994) This may cause increased incidence of learning problems, ADD, as well as speech, hearing or vision abnormalities (Healthy High, 2008). While the effects of exercise on the symptoms of FAS have not been extensively studied, participation in exercise may reduce the rates of infants born with FAS by decreasing alcohol consumption in the general population. In college students, those who were involved in physical activity programs had lower rates of alcohol consumption (Gottlieb and Baker, 1986). Decreased drinking overall would result in decreased drinking when pregnant, and therefore lower risk of FAS in one's children. Beyond this, alcohol consumption of parents is related to alcohol consumption by their children; if one or both parents regularly drink alcohol, the children tend to as well (Gottlieb and Baker, 1986). For this reason, if exercise promotes decreased alcohol intake in the parents, it will transfer to decreased alcohol intake in the following generation. The same is true for exercise; Gottlieb and Baker (1986) found that physical activity levels in fathers specifically correlated with fitness levels in their offspring of either gender.

IV: ABORIGINAL MENTAL HEALTH ISSUES

Quality of life (QoL) and mental health are highly intertwined concepts, although difficult to directly quantify. Studies have been done, however, to relate the phenomena. In a

study by Paxton and associates (2010), it was determined that when QoL is conceptualized under a framework that includes health- related constructs such as physical function, social function, and mental function, physical activity may be directly related to QoL. However, the same study also found that when QoL is conceptualized with constructs such as satisfaction with life (i.e., "global QoL"), physical activity is generally indirectly related to global health through its association with constructs that are perceived to be more proximal (i.e., physical and mental health) (Paxton *et al.,* 2010). There are many facets of mental health, which can be positively affected by exercise.

Anxiety

Anxiety, an unpleasant mood characterized by thoughts of worry, is an adaptive response to perceived threats that can develop into a maladaptive anxiety disorder if it becomes severe and chronic (Herring *et al.,* 2010). Unfortunately, anxiety often remains unrecognized or untreated among patients with a chronic illness as their other symptoms are given precedence in treatment and attention. This is especially important to note as anxiety symptoms can have a negative impact on treatment outcomes in part because anxious patients can be less likely to adhere to prescribed medical treatments (Herring *et al.*, 2010). It has been found, however, that exercise training may help improve anxiety symptoms among patients as well as among healthy participants, and that anxiolytic effects may be more pronounced in clinical or subclinical populations (Herring *et al.,* 2010, Conn, 2010a). There are more traditional forms of anxiety management available, such as pharmacological and cognitive behavioural therapies, but there continues to be interest in alternative therapies such as relaxation and exercise (Herring *et al.,* 2010). The present results provide clinicians with solid evidence to recommend exercise training to patients as a means for reducing anxiety symptoms with minimal risk of adverse events, and it

may be especially useful for patients who prefer non-pharmacologic treatments (Herring *et al.,* 2010)

Exercise session durations greater than 30 minutes showed larger effects than durations of 10 to 30 minute and similar effects have been found in studies of exercise training effects on cognitive function in older adults (Herring *et al.,* 2010).

While trait anxiety is conceptualized as a relatively stable measure of individual differences in anxiety proneness, there is substantial evidence that trait anxiety scores are sensitive to change. Short-term interventions (up to several months) designed to reduce anxiety produce moderate-to-large reductions in trait anxiety scores (Herring *et al.,* 2010). Findings suggest that interventions are equally effective across ages and both genders (Conn, 2010a). Exercise training interventions were also effective as well for special populations who suffer from illnesses such as cardiovascular, cancer, chronic pain, fibromyalgia, psychological, and pulmonary (Herring *et al*., 2010). This is highly applicable to the exercise program offered through Red Fox, as the at-risk populations which it serves, many of whom may have other health complications, are able to reap similar benefits through physical activity.

Adherence is integral to the efficacy of exercise training (Herring *et al.,* 2010). Exercising in a group setting, and in fitness centers, may be effective because it provides social interaction and because participants can continue the pattern of exercise behavior established during the intervention by continuing to work out at similar fitness centres (Conn, 2010a). Research on physical activity and anxiety found that interventions were most effective when they were supervised and recommended fitness-center-based activity following the intervention (Conn, 2010a). From this information it can be seen that Red Fox may greatly improve physical

activity adherence as it utilizes a group format and take place in fitness centres throughout the Greater Vancouver Area, all of which is supervised by a trained professional.

Depression

Depression has a huge impact on QoL and mental health, which is easy to understand. What is less well known is that aside from the mental and emotional effects, depressed patients also tend to have heightened somatic symptoms, such as headaches and abdominal pain (Dang, 2010). Both supervised and unsupervised exercise has been found to reduce depressive symptoms and should be encouraged even among people with chronic illnesses (Dang, 2010, Conn, 2010b). However, some studies have reported that supervised exercise training results in larger improvements in functional capacity compared with home-based exercise (Ströhle, 2009). As a treatment for depression, exercise can be easily implemented and used in conjunction with other treatment plans, such as pharmacology or psychotherapy (Dang, 2010).

When considering the effectiveness of exercise in improving QoL for those with depression, many studies strongly advocate its inclusion in a treatment program. In patients receiving a standard antidepressant treatment, the reduction of depression scores and the response rates were larger in the exercise training group (Ströhle, 2009) and that greater energy expenditure is associated with larger reductions in depressive symptoms (Ströhle, 2009). The mechanisms responsible for exercise-related improvements in depression and anxiety disorders are not all known, and it is most likely to be a complex interaction of psychological and neurobiological mechanisms underlying, mediating and/or moderating these effects (Ströhle, 2009). Exercise can also have indirect psychological benefits by increasing self-efficacy and improving self-esteem (Dang, 2010). Although most research has emphasized endurance type exercise, recent findings suggest that including flexibility and resistance exercise may be

important for improving depressive symptoms and that no difference between endurance and resistance exercise in major depression symptoms (Conn, 2010b). Red Fox, as mentioned previously, incorporates cardiovascular, resistance, and flexibility components into each workout to the best of the individuals' abilities given their health and fitness.

It can be difficult when trying to engage individuals suffering from depression in physical activity. Potential ways to mediate this include identifying the major barriers to exercise such as low motivation, lack of knowledge about appropriate forms of exercise, and fear of injury, and ways to overcome them (Dang, 2010) One of the major barriers in many cases for low-income populations is accessibility. Red Fox helps to attenuate this difficulty by coordinating the fitness program at local fitness centres. It is also important to approach individuals in an empathic manner and encourage them to seek treatment to improve their QoL through exercise, thus accruing both the mental and physical gains (Ehrman *et al.,* 2009). Red Fox is very sensitive and knowledgeable when it comes to the challenges faced by many of the participants, and are thus well suited to encourage participation.

In the adult fitness program especially, exercise may have a huge impact on QoL in relation to depression. Older adults are less apt to present with symptoms meeting criteria for major depression. They are more likely to present with sub-syndromal or minor depressive symptoms but, whether major or minor, treatment can help patients (Fulton, 2009). Untreated patients are at high risk for suicide, especially older men (Fulton, 2009). While treatment in the older adult begins with non-pharmacologic measures, other interventions aside from exercise like increasing social activity, pet therapy, and art therapy also have been found to be helpful (Fulton, 2009). Red Fox also therefore provides interventions for depression, as the fitness program is also a highly social activity.

A study by Dang and colleagues (2010) identified several mechanisms by which exercise may improve mood and thereby decrease depression:

Monoamines. A dysregulation and an imbalance of monoamines in the central nervous system, especially serotonin, dopamine, and norepinephrine, have been implicated as a major cause of depressive disorders. Exercise has been shown to result in elevated levels of serotonin metabolites, suggesting increased serotonin metabolism from physical activity. Because most antidepressants increase levels of monoamines, it's been hypothesized that people with depression have an imbalance of these monoamines and that correcting this imbalance would improve mood.

Stress response. Many people with depression experience hyperactivity of the stress response, coupled with an overproduction of stress-related hormones such as cortisol. This hypersensitivity to stress has also been implicated as an important factor in depression. Adults who exercise have been found to have an attenuated physiological response to stress and a reduction in stress hormones.

Beta-endorphins. Another well-known benefit of exercise is the surge of serum beta-endorphins. Beta-endorphin is an endogenous opioid that not only provides an analgesic effect with rigorous exercise but elevates mood. However, studies on the long-term relationship of beta-endorphins to major depressive disorder have been inconclusive. One study revealed a positive correlation between beta-endorphins and depression, yet other studies found no relationship. Depression is a complex disorder that most likely involves multiple biochemical and psychosocial pathways.

Brain-derived neurotrophic factor (BDNF). More recently, scientists have discovered that exercise increases the production of a brain molecule called BDNF. BDNF is crucial for

providing support to the development and maintenance of functions in the central and peripheral nervous systems as well as preventing damage to brain cells and enhancing their survival. Findings from several studies suggest that the action of BDNF is compromised in people with depression and, as a result, their plasma levels of BDNF are lower. In contrast, patients who were treated with anti-depressants demonstrated an increased level of BDNF. These results suggest a strong association between the role of BDNF and depression.

Suicidal Ideation

The Native American population suffers from much higher rates of suicide than the general North American population. This is a serious issue which involvement in exercise programs may help to attenuate through multiple mechanisms. The psychological advantages of physical activity, including improvements in overall emotional well-being, mood, anxiety, stress, and self-esteem, correlate with a decreased risk of suicide (Taliaferro *et al*., 2010). Furthermore, compared to nonparticipants, sport participants report less frequent feelings of hopelessness (Taliaferro *et al.,* 2010). Sport participants also may experience greater social support when they become integrated into an extended social network that includes teammates, coaches, health professionals, family, and community (Taliaferro *et al.,* 2010). While Red Fox is not a "team sport" program, it also provides a structured and supported framework, as well as a social network to its participants.

V: LOW SOCIOECONOMIC STATUS RELATED HEALTH ISSUES

HIV

Unfortunately, there are many health conditions, which affect low-income populations to a much greater extent than higher socioeconomic classes. HIV/AIDS is one of these conditions. Vancouver residency in downtown and especially downtown eastside was correlated to HIV

infection in several studies in a meta-analysis. The Downtown eastside has the highest rates of illicit drug use and lowest life expectancy per capita income in all of Canada (Duncan *et al.*, 2011). Poverty is a key determinant of HIV infection because it increases the susceptibility of infection through raised rates of mal-nutrition, STI's and can also be linked to a lack of education and access to medical care (Duncan *et al.,* 2011). A large component of the affected population is aboriginal. The prevalence of HIV in aboriginal peoples has been increasing greatly over the past decade. Before 1993 the aboriginal community only accounted for 1.2% of the reported cases in the Canadian population and since then it has jumped to 27.3% by 2006. Many researchers believe that the ongoing effects of discrimination, cultural disruption and poverty have led to these increases in social exposure to HIV (Duncan *et al.*, 2011). Prevalence rates among aboriginal HIV positive individuals seemed to be higher in those who were drug users compared to HIV positive non-aboriginal people who were also drug users (Duncan *et al.,* 2011). As an organization based out of the Downtown eastside and aimed specifically at aboriginal and low income populations, Red Fox provides a much needed service to an underserviced population and has the potential to greatly improve their health and QoL.

Most patients now treated with highly active antiretroviral therapy (HAART) but there are many physical and psychological side effects that occur that lead to a decreased QoL. Some of the physical side effects include: headache, pain, neuropathy, nausea, vomiting, fatigue, rash or dry skin, anorexia, weight changes, alter metabolic processes such as lipid alteration and bone disease. Some of the neuropsychiatry side effects are anxiety, confusion, nightmares, hallucinations, depression, agitation and mania. The most common symptoms are anxiety, depression, pain and fatigue (Ciccolo *et al.,* 2004). For this reason, interventions for increasing QoL are extremely important. There are extra pharmacological agents to treat the side effects of

this medicine but patients find the burden of more pills and the scheduling of all these pills to be quite difficult, therefore using alternate forms of treatment to help suppress the side effects has become increasingly popular (Ciccolo *et al.,* 2004).

Exercise is one of the key management strategies used by healthcare professionals to address impairments such as pain or weakness, activity limitation due to problems with body function and participation restrictions such as inability to work (O'Brien *et al.*, 2004). A study on fibromyalgia cited by Ciccolo and associates (2004) found that mild to moderate exercise is an effective treatment for fatigue and that single 20 minute bouts of exercise have been effective for increasing pain tolerance in patients and had long term pain reducing effects with exercise training. Patients also felt improvements in pain following an exercise bout. Since fibromyalgia results in similar chronic musculoskeletal pain to HIV, it is projected that this type of training would also be greatly beneficial to those with HIV/AIDs (Ciccolo *et al.*, 2004). Progressive resisted exercises or a combination of resisted and aerobic exercises may have a statistically significant and clinically important improvement in body weight and composition in individuals with HIV (O'Brien *et al.,* 2004). Also suggested are improvements in cardiopulmonary fitness, strength and psychological improvements (O'Brien *et al*., 2004). Another study by Stringer and colleagues (1998) found that the aerobic fitness increased significantly with exercise participation, and that although CD4 and HIV RNA did not decrease with a statistical difference, it did decrease slightly in participants who exercised in comparison to a control group. A finding from the same study of great importance was that the exercise group reported an increased quality of life, hope and desire to live (Stringer *et al.*, 1998).

Drug Use

As mentioned previously, the Downtown eastside has the highest rates of illicit drug use and lowest life expectancy per capita income in all of Canada (Duncan *et al.,* 2011). This is again an issue that is disproportionately prevalent in the aboriginal population. In a study on drug usage in Vancouver, after 42 months the aboriginal incidence of injection drug users was significantly higher than non-aboriginal injection drug users. (Craib *et al.*, 2003). Furthermore, in Vancouver Aboriginal injection drug users are becoming HIV positive at twice the rate of the non-aboriginal drug users. (Craib et al., 2003). 33% of aboriginals diagnosed with HIV between 1998-2000 were less than 30 years old. Drug injections accounted for 60% of the new infections during that time. (Craib et al., 2003).

Exercise may help to decrease the incidence of drug use. Substance abuse has been related to risk factors such as low self-esteem, lack of self-control, and negative lifestyles such as poor eating habits, stress and inactivity (Collingwood *et al.,* 2000). All of these factors may be exacerbated when one is living in poverty. In a study by Collingwood and associates (2000) where fitness physical fitness program was implemented as an intervention to adolescents showed that the youth who increased their physical fitness levels by participating in the physical training program showed improved fitness levels and improved lifestyles. They also had improved risk factors such as an improved self–concept which is correlated to reduced substance abuse patterns. (Collingwood *et al.,* 2000). A follow up study was conducted with a physical activity program for 12 weeks. The programs saw a consistent increase in activity level and physical fitness, as well as decreases in psycho-social risk factors such as decreased anxiety and depression, and increases in self-esteem and self-concept (Collingwood *et al.,* 2000).

When helping individuals to recover from drug dependency, one must promote wellness in the areas of nutrition, physical fitness, stress management, environmental sensitivity and self-responsibility (Kremer *et al.,* 1995). Red Fox clearly aids in increasing physical fitness (which also relates to decreased anxiety), and may also improve self-responsibility through the use of goal-directed activity. Beyond this, studies have shown that substance abuse behaviours occur during leisure or recreational time (Kremer *et al.,* 1995). The programs implemented during these times have displayed to be suitable for treatment in substance abuse because of its contributing factors to lifestyle changes (Kremer *et al.,* 1995).

VI: HEALTH BENEFITS OF OTHER RED FOX PROGRAMS

In addition to the adult fitness program, Red Fox offers several other health and community related programs including a children's after-school activity program, an elders' walk, and a community meal program. These programs also provide meaningful benefits to aboriginal and low-income families, as well as to all members of the community.

The benefits of exercise in children have been well established. From a physical standpoint, the physical health benefits described earlier apply to children as well as adults in terms of body composition and cardiovascular fitness. However, there are additional benefits in children as their bodies are developing at this point in life. Weight-bearing physical activity during childhood is an important determinant of peak bone mass (MacKelvie *et al.,* 2003). This means that physical activity performed through organized physical education programs or recreation programs could be a feasible strategy for primary prevention of osteoporosis. MacKelvie and associates (2003) proved this using a 10-12 minute program of diverse weight-bearing exercises during regularly scheduled physical activity, such as in the program provided by Red Fox. Weight bearing activities don't need to involve weight lifting or resistance training,

necessarily, it can be as simple as walking or running during which the load of the body stimulates bone growth. Results from a study done by Kiluk and colleagues (2008) revealed that children with ADHD who participated in greater levels of physical activity displayed fewer anxiety or depression symptoms than did those who engaged in less physical activity. These results suggest that active sport participation may be associated with a reduced expression of anxiety or depression symptoms in children, similar to the benefits in adult depression and anxiety which was discussed previously (Kiluk *et al.,* 2008). One of the most important benefits of participation in physical activity during childhood is its impact on adult activity levels and health. Adolescents that hold a more positive attitude toward sports, exercise, and fitness are more active 5 and 10 years later, suggesting that youth activity promotion efforts may be beneficial throughout one's lifespan (Graham *et al*., 2010). These findings suggest the importance of helping youth develop positive attitudes towards physical activity (Graham *et al.,* 2010).

The Elders' Walk Program is also important in promoting health throughout one's lifespan and increasing the overall fitness of the community. It has been shown that skeletal muscle mass is progressively lost due to ageing and is associated with reduced muscle strength, loss of functional capacity and an increased risk for developing chronic metabolic disease (Koopma, 2010). Exercise training has proved to be an effective intervention for decreasing and treating the loss of muscle mass and strength in the elderly which also results in increased independence in the later life (Koopma, 2010, Mazzeo and Tanaka, 2001). Additionally, regular exercise limits VO_2max decreases associated with age, which would again help to increase functional independence (McArdle *et al.,* 2007). Participation in moderate intensity exercise for 30 minutes on most days of the week lowers risk of developing many conditions related to aging:

cardiovascular disease, obesity, type 2 diabetes, stroke, dementia, arthritis, osteoporotic fracture and chronic back pain (Dakin *et al.,* 2010). Vogt and colleagues (2010) determined that physical exercise programs performed by the elderly, specifically walking at a self-selected pace for 45-60 minutes such as in the Red Fox program, have beneficial effects on their general feeling of well-being. This enhanced mood was proven by examining the associated changes in cortical activity in the brain (Vogt *et al.,* 2010).

By offering a program specifically for the elderly, Red Fox provides a valuable service to an underserviced population. How older adults view their health has received growing recognition as a powerful predictor of functional ability, psychological well-being, and mortality (Ruthig *et al.,* 2009). This means that an older individual's physical health has significant impact not just on their QoL but on their lifespan. Access to health and fitness care is often limited to older adults, and increasing accessibility would help the individuals to maintain their health by engaging in health promoting behaviours (Ruthig *et al.*, 2009). Native Americans as a population continue to have less health care access and insurance coverage than non-Natives, and this disparity is compounded in older adults by the fact that many elders have poverty-level incomes, lack telephones, and live alone (Ruthig *et al*., 2009). With the rise in older Native American populations, links between barriers to health care and self-rated health are critical to consider because of the importance of self-related health to well-being and survival (Ruthig *et al.,* 2009). Not surprisingly, one of the major factors in predicting better self-related health is to increase activity levels (Ruthig *et al.,* 2009).

The last program to be discussed is the meal program. Studies have been done specifically on the potential benefits that formal food-sharing initiatives can have on First Nation populations (Haman *et al.,* 2010). They found that these programs could play an important role

in reversing negative perceptions of traditional diets, subsequently increasing the likelihood that community members would engage in these initiatives, and benefit from the health advantages. Khalil and associates (2010) found the prevalence of overweight among indigenous populations is four to five times higher than that of the general Canadian population of similarly aged children. Therefore nutritional education in this population has the potential for a large impact on community health and wellness. This is especially true as overweight children tend to become obese adults. However, developing healthy eating patterns early in life is a challenge due to the socio-economic context of food availability and choices, such as in the downtown east side, all the more reason why Red Fox's meal program is particularly beneficial to their target population. It has been found that within the aboriginal community there was high consumption of high sugar and high-fat food items, low fruit and vegetable and milk product intake as well as low traditional food consumption (Khalil *et al*., 2010). By providing opportunities to engage in healthier eating, Red Fox may help children as well as adults develop healthier eating habits and a better nutritional awareness in a positive social setting. Also of importance is the fact that Aboriginal people have differing experiences and preferences for types of support to improve healthy lifestyles, which must be noted by community health and social work practitioners (Adams *et al.,* 2011). The authors of the study advocated for the implementation and development of programs that reinforce cultural values and meet the population's expectations (Adams *et al.,* 2011). Red fox is a dynamic and community-minded program that is knowledgeable and sensitive to the needs and preferences of its participants. It is always seeking feedback, which allows it becomes a continuously more enjoyable and beneficial program provider.

VII: POSSIBLE OPPORTUNITIES

Psychological Impact of Past Aboriginal Treatment

The gross mistreatment of the Aboriginal population in the past has left psychological scarring on many individuals. The survivors of abuse are likely to benefit from yoga, as it has been found to lead to improvements in mood and self-esteem in victims of abuse. Yoga practice might also help survivors of abuse to employ less dysfunctional coping mechanisms. For example, Dale and colleagues (2009) found that women with histories of eating disorders reported a decrease in eating disorder symptoms following a yoga workshop (Dale *et al.,* 2011). This encouraging outcome gives hope that all women could experience such beneficial outcomes from yoga, and it could be a positive addition into the Red Fox program. Yoga might be an effective strategy to normalize autonomic function (Dale *et al.,* 2011). In addition, the experience of going to a yoga studio and being part of a class could help these individuals to socially engage and feel less isolated (Dale *et al.,* 2011). Results indicated that yoga experience significantly contributed to the prediction of self-concept, dysfunctional coping, and endorsed yoga benefits (Dale *et al.,* 2011).

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