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THE EFFECTS OF GENDER AND AGE ON THE TRAINING PRACTICES (DISTANCE AND FREQUENCY) AND BODY MASS INDEX OF MASTERS CYCLISTS.

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The effects of gender and age on the training practices (distance and frequency) and body mass index of masters cyclists.

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DECLARATION

The author, taking into account all the due care and according to his belief, describes this thesis as original research carried out by the author in the School of Medical and Applied Sciences at Central Queensland University. The material has not been submitted, either in whole or in part, for a degree at this or any other university.

Campbell Macgregor

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Signature Redacted

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ABSTRACT

While the training practices of young cyclists have been previously investigated, no research to date has examined the training practices of masters cyclists. The purpose of this study was to examine the current training practices and body mass index (BMI) of masters cyclists in Queensland, Australia. Specifically, the current study investigated the effects of both gender and age on training practices (frequency and distance) and BMI among male and female masters cyclists over the age of 35 years. An online survey questionnaire was developed after being trialed using a focus group consisting of local Rockhampton masters cyclists. With the support of Cycling Queensland, the online survey was sent to all eligible cyclists within Queensland over the age of 35 years. Complete responses were received from 181 male and 27 female masters cyclists with a total response rate of 19%. Student's t-tests and ANOVA analyses were undertaken to examine gender and age group differences in training practices. Results showed that both gender and age have no effect on either the distance trained per week or the frequency of training per week in masters cyclists. While there was no effect of age on BMI, there was significant lower BMI ($t(207)=4.08$ $p=0.00$) in females (22.9 ± 3.0 kg/m^2) compared to male (24.9 ± 2.6 kg/m^2) masters cyclists. In conclusion, the present study found that both female and male masters cyclists maintain similar training distances and frequencies of training per week as they appear to age. Female masters cyclists have a lower BMI than male masters cyclists however with age BMI does not change in masters cyclists.

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CHAPTER 1: INTRODUCTION, PURPOSE AND RESEARCH QUESTIONS

1.1 INTRODUCTION

Master athletes are generally above 35 years of age and train systematically for competitions designed for older adults (Reaburn and Dascombe, 2009). The competitions feature five-year age- groups normally beginning at age 35 years (Kibler, Putukian, and Herring, 2010) with some sports such as swimming (25 years and over) having different starting age criteria to be classified as a masters competitor. One of the major sports that older athletes participate in is cycling (Ransdell, Vener and Huberty. 2009).

In recent years there has been a significant increase in the number of older athletes continuing to train and compete at high performance levels within both individual sports (Barr, Cameron, Balkau, Zimmet, Welborn, Tonkin and Shaw, 2010) and multi-sport events designed for masters athletes. For example, according to the International Masters Games Association website (IMGA, 2014), the first World Masters Games held in Toronto, Canada in 1975 had 8,305 contestants competing in 22 sports from 61 countries. In contrast, at the 2009 World Masters Games in Sydney, Australia, there were 28,676 competitors competing in 28 sports from 95 countries.

The Australian population is increasingly entering the over 65 years age group and growing obese (Rowe, Ellis, Rimajova, Bourgeat, Pike, Jones and Fripp, 2010). These increasing levels of both ageing and obesity present challenges for both government and health agencies (Mobbs and Hof, 2010). For example, the cost of overweight and obese people in Australia was calculated in 2005 to be $21 billion (Lee and Magliano, 2010). To help minimize this negative impact, both young and older

individuals are encouraged to engage in both exercise and competitive sports such as cycling.

The regular participation of younger individuals in exercise and sport encourages positive aerobic fitness, body composition, bone mineral density, blood fats and enhanced motor abilities (Amireault and Godin 2014). Similarly for the masters athletes, regular engagement in physical training programs is an effective way to reduce or even prevent various functional declines commonly observed with ageing process (Kibler, Putukian, and Herring, 2010). Master athletes have the ability to positively respond to these training programs (Reaburn and Dascombe, 2009). Physical training increases the functional capacity of master athletes by helping to maintain muscle quality and quantity as well as reducing the risk of heart disease, diabetes, and osteoporosis (Barr, et al., 2010).

There have been a number of previous studies examining the training practices of younger athletes from rowing (Guellich, Seiler and Emrich, 2009), triathletes (Gaskill, Serfass, Bacharach, and Kelly, 1999) and professional cycling (Schumacher and Mueller, 2002). In cycling, Faria, Parker, and Faria (2005) reported that professional road cyclists trained distances around 30-35,000km per year, which was supported by a more recent study conducted by Liu, Davidson, Bhopal, White, Johnson, Netto and Sheikh (2012) who studied the training practices of elite male cyclists.

A number of previous research studies have examined the training practices of master athletes in different sports. For example, Klitgaard, Mantoni, Schiaffino, Ausoni, Gorza, Laurent-winter... Saltin (1990) examined masters runners, while Knechtle, Knechtle, Rosemann, and Senn (2011) conducted a study into the training practices of Ironman triathletes of all ages. Therefore, the training practices of both younger cyclists

and master athletes from a number of other sports apart from cycling have been examined in previous research. However, to date no study has examined the current training practices and BMI of master cyclists as they age (Reaburn and Dascombe, 2009). The current study examined the effects of both age and gender on training practices (frequency and distance) and BMI among male and female masters cyclists over the age of 35 years.

1.2 PURPOSE OF THE STUDY

The purpose of current study was to examine the effects of both gender and age on training practices (frequency and distance) and body mass index among male and female masters cyclists over the age of 35 years.

1.3 RESEARCH QUESTIONS

The study aims:

1. To determine the effect of gender on distance of training per week for masters cyclists in Queensland.
2. To determine the effect of gender on frequency of training per week for masters cyclists in Queensland.
3. To determine the effect of gender on body mass index in masters cyclists in Queensland.
4. To determine the effect of age on distance of training per week for masters cyclists in Queensland.
5. To determine the effect of age on the frequency of training per week in masters cyclists in Queensland.
6. To determine the effect of age on body mass index in masters cyclists in Queensland.

1.4 RESEARCH HYPOTHESES

1. There will be *no* effect of gender on distance of training per week for masters cyclists in Queensland.
2. There will be *an* effect of gender on frequency of training per week for masters cyclists in Queensland.
3. There will be *an* effect of gender on body mass index in masters cyclists in Queensland.
4. There will be *an* effect of age on distance of training per week for masters cyclists in Queensland.
5. There will be *an* of age on the frequency of training per week in masters cyclists in Queensland.
6. There will be *an* effect of age on body mass index in masters cyclists in Queensland.

1.5 LIMITATIONS

There were a small number of females sampled. However, the ratio of male to female respondents t is reflective of the population researched (Masters cyclists in Queensland).

Given the present study used a self-report online survey, there may be an estimation bias in body mass index reporting. This has been shown in endurance athletes of 0.4kg/m^2 by Knechtle et.al. (2012)..

The survey was conducted in the masters cyclists off-season. Therefore, reported training distances and frequency might reflect this off-season training. To counter this athletes were asked to refer to their training dairy wherever possible to limit recall errors.

Another limitation identified is that the current research was conducted without

examining the intensity of the training practices. The researcher understands that this is an important part of training practices but after the focus group discussion, the ability for the individuals to recall or validly report levels of training intensity and apply was confusing.

CHAPTER 2: LITERATURE REVIEW

The present chapter examines the existing research literature related to exercise training practices and BMI of master athletes. The chapter will briefly review how the world population is ageing and compare and contrast this with what is occurring in Australia. The review will then examine gender and age changes in body mass index (BMI) in the general population followed by examining BMIs in athletes and the concept of successful ageing. Furthermore, the association of BMI with health will be examined along with the effects of physical activity on health in ageing individuals with a focus on the masters athletes. The review will then examine a brief history of cycling followed by the known health benefits of cycling. Finally, the review will examine gender and age effects on training practices of young and older athletes, and conclude with what is currently known about training practices and BMI of masters athletes and masters cyclists.

2.1 AGEING

2.1.1 Ageing as a process

Ageing is the accumulation of changes in a person over time (Bowen and Atwood, 2004). Ageing in humans is a multidimensional process of physical, psychological, and social change. Some dimensions of ageing grow and expand over time, while others decline. For example, reaction time may slow with age, while knowledge of world events and wisdom may expand. Through research it is known that even late in life, capacity for physical, social and mental growth exists (Withall et al., 2014). Currently, there is a global trend of an increase in the percentage of the world's population moving into older age (World Health Organisation, 2013).

2.1.2 World ageing

According to the WHO (World Health Organisation, 2013), from 2000 until 2050, the world's population aged 60 years and over will more than triple from 600 million to 2 billion. Most of this increase is occurring in less developed countries where the number of older people will rise from 400 million in 2000 to 1.7 billion by 2050.

Among the countries currently classified by the United Nations as more developed (with a total population of 1.2 billion in 2005), the overall median age rose from 29.0 years in 1950 to 37.3 years in 2000, and is forecast to rise to 45.5 years by 2050. The increase in the median age suggests that health facilities have improved and individuals are enjoying a healthier life with a longer expected lifespan. This includes improvements in medical care (medications, surgery techniques) and also the increase focus on preventative screening measure (e.g. breast screening) (WHO, 2014). The corresponding figures for the world as a whole are 23.9 years in 1950, 26.8 years in 2000, and 37.8 years in 2050 (Shaw, Sicree, and Zimmet, 2010). Theoretically, by 2050, half of the world's total population will be able to participate in masters games or events designed for masters athletes.

2.1.3 Ageing as a demographic challenge

Population ageing (the increase in both the proportion and number of people at older ages) has emerged as one of the most important demographic challenges of the twenty-first century and is being faced by both developed and developing countries (Kippen, 2012). This demographic change has several major implications for public health policy. Firstly, good health is vital if older people are to remain independent and to play a part in both family and community life. Secondly, life-long health promotion and disease prevention activities such as physical activity and exercise can prevent or

delay the onset of non-communicable and chronic diseases, such as heart disease, stroke and cancer (Shaw, Sicree, and Zimmet, 2010).

2.1.4 Ageing in Australia

The 'aged' population is generally defined as those aged 65 years and over (Werner, 2011). In 2010, 14 per cent of Australia's population was aged 65 years and over. This figure has increased from nine per cent in 1970 and is projected to further increase to approximately 25 per cent by 2050 (Australian Bureau of Statistics [ABS], 2013a). In population terms, by 2025 about 6 million people in Australia will be over the age of 65 years (Rowe et al., 2010).

Australia's population is getting older for three reasons. Firstly, significantly more people are living into older age than in the past. For example, more people are surviving to age 65 years, and those who do can currently expect to live another 20 years on average, up from 14 extra years in 1970. As a result, life expectancy has increased over the past 100 years and is projected to continue increasing into the future (Hugo, 2007). Secondly, birth rates in Australia are much lower than they have been in the past. Fewer births mean proportionately more people at older ages. The most common measure of birth rates is the total fertility rate (TFR), which is a count of the average number of births to a woman over her lifetime. In Australia, the TFR fell from a peak of 3.6 births per woman in 1961, to a rate of between 1.7 and 2.0 births per woman over the past 25 years (Lattimore and Pobke, 2008). Finally, past high birth rates mean that a population 'bulge' is now moving through to old age. In Australia, birth rates increased through the 1940s and remained high through to the early 1970s. The period 1946–61 is referred to as the 'post-war baby-boom', and those born during this time are referred to as 'baby-boomers'. The first of the baby-boomers, born in

1946, officially entered old age in 2011 (Worsley, Wang, and Hunter, 2012).

In both the world and Australian populations, another trend that has been closely following ageing is obesity level. The next section of this review will examine gender and age effects on obesity by looking at self-reported BMI in both the world and Australian populations, then finally examining the cost of obesity in the ageing populations of both the world and Australia.

2.2 BODY MASS INDEX (BMI)

Body mass index is found by dividing an individual's body weight (mass) in kilograms by their height squared in meters (ABS, 2009). These results are then used to place individuals into several ranges which include underweight (BMI < 20 kg/ m^2), normal (BMI 20-24.9 kg/m^2), overweight (BMI 25–29.9 kg/ m^2) and obese (BMI ≥30 kg/ m^2) (ABS, 2009). New ranges have been developed as the general population is becoming more obese, these include the obesity categories I (BMI 30–34.9 kg/ m^2), II (BMI 35–39.9 kg/ m^2) and III (BMI ≥40 kg/ m^2) (World Health Organisation, 2014).

Body mass index is an inferential technique with some methodological shortcomings that include self-reporting and the fact that muscle weighs more than fat (Walsh et.al. 2011). BMI has also been identified as inappropriate for highly mesomorphic populations as a diagnostic tool related to health risk, however the endurance sport population such as cyclists is not mesomorphic (Walsh et.al. 2011).

Using BMI as the population measure, the Australian Bureau of Statistics (2013b) found that obesity in Australia more than doubled in the two decades preceding 2013, and the unprecedented rise in obesity has been compared to the same health crisis in America (WHO, 2014).

In April 2008, the Australian Federal Government added obesity to its list of

"national health priorities," officially elevating it to the same standard of attention given to other chronic health issues such as cancer, heart disease and diabetes. On 1 June 2009, the first Parliamentary comment on obesity in Australia was published, with the Standing Committee on Health and Ageing recommending 20 acts for the Federal Government to consider, including tax incentives to make healthier fruits and vegetables more affordable for Australians, and pressing the government to work with the food industry to lower fat and sugar levels in existing processed food (Banwell et.al, 2012).

Overweight and obesity is measured at the population level for adults using the Body Mass Index (BMI) which is calculated by dividing weight in kilograms by height in metres squared. For example, a woman 1.67m in height and weighing 65kg would have a BMI of 23.3 kg/ m^2 which falls within the healthy weight range. Overweight is measured at a BMI of 25 or more with obesity determined at a BMI of 30 kg/ m^2 or more. These cut-off points are based on associations between and chronic disease and mortality and have been adopted for use internationally by the World Health Organisation (WHO, 2014).

BMI generally overestimates adiposity on those with more lean body mass (e.g., athletes) and underestimates excess adiposity on those with less lean body mass (Walsh et.al. 2011).

Table 1

Classification of adults according to BMI

Classification	BMI	Risk of co-morbidities
Underweight	<18.50	Low (but risk of other clinical problems increased)
Normal range	18.50 - 24.99	Average
Overweight:	>25.00	
Preobese	25.00 - 29.99	Increased
Obese class 1	30.00 - 34.99	Moderate
Obese class 2	35.00 - 39.99	Severe
Obese class 3	>40.00	Very severe

Reproduced from: Obesity: Preventing and Managing the Global Epidemic, 2000, WHO, Geneva

Fat distribution is also an important consideration in assessing overweight or obesity and the associated risk of disease. For example, increased abdominal obesity has been consistently shown to be related to a higher risk of cardiovascular disease, type 2 diabetes and cancer (WHO 2014). Central (abdominal) obesity is measured using waist circumference. Table 2 provides gender-specific waist circumference and risk of metabolic complications associated with obesity in Caucasians.

Table 2

Diseases associated with obesity

Relative risk	Associated with metabolic consequences	Associated with weight
Greatly increased	Type 2 diabetes Gall bladder disease Hypertension Dyslipidaemia Insulin resistance Atherosclerosis	Sleep apnoea Breathlessness Asthma Social isolation/depression Daytime sleepiness/fatigue
Moderately increased	Coronary heart disease Stroke Gout/hyperuricaemia	Osteoarthritis Respiratory disease Hernia Psychological problems
Slightly increased	Cancer (breast, endometrial, colon) Reproductive abnormalities Impaired fertility Polycystic ovaries Skin complications Cataract	Varicose veins Musculo-skeletal problems Bad back Stress incontinence Oedema/cellulitis

Reproduced from: Obesity: Preventing and Managing the Global Epidemic, 2000, WHO, Geneva

Aside from genetic factors, overweight and obesity is caused by an energy imbalance, where energy intake exceeds energy expenditure over a considerable period of time (Hugo, 2007). Hence good nutrition and adequate levels of physical activity play an important role in the prevention of further weight gain throughout the life cycle. It is generally agreed that this energy imbalance is due to large scale changes in the modern environment (Hugo, 2007).

The health problems and consequences of obesity are many and varied, including musculo-skeletal problems, cardiovascular disease, some cancers, sleep apnoea, type 2 diabetes, and hypertension to name a few. Many of these are often preventable though a healthy and active lifestyle. In particular, obesity is strongly linked to type 2 diabetes, identified as one of the six National Health Priority Areas. There are several new large well conducted studies that have shown a clear relationship between excessive body weight and increased mortality and morbidity, these associations are shown in Table 2.

Mortality and morbidity are also associated with the amount of weight gained in adult life. For example, a weight gain of 10kg or more since young adulthood is associated with increased mortality, coronary heart disease, hypertension, stroke and type 2 diabetes (WHO 2014).

The literature examining physical activity interventions among older adults has grown in the past decade. In a Cochrane review, Ashworth et.al (2005) have attempted to synthesize this literature with reviewers' definitions of older adults ranging from a minimum age of 40 years to a minimum mean sample age of 65 years (Ashworth, Chad, Harrison, Reeder and Marshall, 2005).

Van der Bij, Laurant, and Wensing, (2002) in general, found interventions among older adults, have been effective in increasing physical activity behaviour, at least in the short term and reducing BMI. These interventions typically have multiple components and involve some combination of educational, behavioural, and cognitive-behavioural strategies (Markus et.al. 2006). Although it is difficult to disentangle the most effective intervention components, general health education alone does not appear to be an effective method of promoting physical activity in older men and women (Conn, Hafdahl, and Mehr, 2011).

In terms of setting, in a review conducted in 2007 that compared home- versus center-based physical activity programs among participants >50 years old, center-based programs appeared to be superior in the short term for producing fitness outcomes among those with cardiovascular disease, although adherence to physical activity programs was superior in home-based programs (Cyarto, Moorhead and Brown, 2007).Thus, physical activity promotion among older adults has shown some short-term efficacy when programs have gone beyond educational approaches(Conn, Hafdahl, and

Mehr, 2011). Looking at how programs are developed, the model of masters athletes may provide goal-setting, training in group environments, contact with a sports club, therefore providing face-to-face interventions aimed at increasing physical activity levels in older individuals therefore maintaining a healthy BMI or lowering a high BMI to a normal range (King, 2001).

2.2.1 Gender difference and obesity

The effects of gender on obesity trends have been widely examined throughout the world. In 2004-05, approximately 41% of adult males and 25% of females across the world were classified as overweight (BMI ≥25.0 kg/ m^2) with 18% of males and 17% of females classified as obese (BMI ≥30.0 kg/ m^2) (World Health Organisation, 2014). Historically, in 1995, 38% of males and 21% of females across the world were classified as overweight and 11% of males and 11% of females were classified as obese. Thus, for both males and females in the world, increases have been recorded in both the overweight and obese groups across all age groups (Walls, Magliano, Stevenson, Backholer, Mannan, Shaw and Peeters, 2011). When compared to results from 1995 using the same measures, the proportion of adults classified as overweight or obese has increased substantially. By 2015, 75% of adults will be overweight or obese, and 41% will be obese (Wang and Beydoun, 2007).

2.2.2 Prevalence of obesity in the Australian population

A recent report into the global burden of obesity in both children and adults found that Australia is now equal with the United States and only slightly less than New Zealand in the prevalence of overweightness and obesity (Ng, Fleming, Robinson, Thomson, Graetz, Margono and Gakidou 2014). The researchers found that 75 to 80 per cent of middle-aged men are overweight in Australia. Furthermore

this is considerably worse than what the WHO found in their 2011 report that 67.4% of Australian adults are overweight, ranking Australia 21st in the world, and third out of the major countries in the Anglosphere behind the United States of America (ranked 9th) and New Zealand (ranked 17th) (World Health Organisation, 2011). Banwell, Broom, Davies and Dixon (2012) reported 53.6% of Australians being overweight, with a further 18% falling into the obese category. This is nearly double the reported number from 1995, when 30% of adults were overweight and 11% were obese (Dunstan, Barr, Healy, Salmon and Owen, 2010).

In 2004-05, 46% of males between the ages of 55-64 years, 41% of males between the ages of 65- 74 years and 37% of males aged 75 years and over, were classified as obese (Walls et al., 2011). For females, Walls, et al. (2011) reported that 31% between the ages of 55-64 years, 31% between the ages of 65-74 years and 25% aged 75 years and over, were classified as overweight, while 23%, 17% and 10%, respectively, were classified as obese (ABS, 2013a). This suggests that females have a lower self-reported BMI compared to males in Australia.

More recently, Haby and coworkers (2012) used the Australian National Nutrition Survey 1995 data set to predict mean BMI and prevalence of obesity in 2005, 2015 and 2025. The analysis suggested that, by 2025, 83% of males and 75% of females aged 20 years and over would be overweight or obese. The researchers noted that the increase in prevalence and mean BMI predicted in this study will have significant impacts on disease burden, healthcare costs and future need for prevention and treatment programs (Haby, Markwick, Peeters, and Shaw, 2012).

Stewart, Tikellis, Carrington, Walker, and O'Dea, (2008) found that Australia is now one of the fattest nation in the world with 4 million Australians, or 26% of the

adult population at the time, considered to be obese (BMI≥30 kg/m^2) compared to an estimated 25% of Americans. A further 5 million Australians are considered overweight (BMI≥25 kg/m^2).

These figures for normal male and female Australians suggest that since 1995, the rates of overweight within each age category have remained relatively consistent. However, the rates of obesity have increased. On a population level, and with obesity only second to smoking as the major cause of preventable death in Australia (ABS, 2013a), the effective management of the Australian obesity epidemic has become not only a health priority, but also an economic priority. Indeed, Colagiuri and collegues (2010), suggested that in 2005 this increasing obesity epidemic was costing the Australian Government and society an excess of $21 billion dollars (Colagiuri, Lee, Colagiuri, Magliano, Shaw, Zimmet and Caterson, 2010).

2.2.3 Cost of world obesity

Obesity is a condition where excess fat weight accumulates to the point where it has an adverse effect on health leading to a reduced life expectancy (Kruk, 2009). This occurs when an individual's energy intake exceeds their energy expenditure with the larger the imbalance, the more rapid the weight gain. Obesity is a health risk and can lead to a range of medical conditions and complications. Specifically, the following risk factors have been widely documented (Barr, et al., 2010; Haskell, Lee, Pate, Powell, Blair, Franklin...Bauman, 2007) to be associated with overweight and obesity:

- Type 2 diabetes
- Coronary heart disease
- High LDL ("bad") cholesterol

- Stroke and hypertension
- Non-alcoholic fatty liver disease
- Gall bladder disease
- Osteoarthritis (degeneration of cartilage and bone of joints)
- Sleep apnea and other breathing problems
- Some forms of cancer (breast, colorectal, endometrial, and kidney)
- Complications of pregnancy
- Menstrual irregularities

In the past 20 years, the rates of obesity have tripled in developing countries that have been adopting a western lifestyle involving decreased physical activity levels and overconsumption of cheap, energy-dense food. Such lifestyle changes are also affecting children in these countries. For example, the prevalence of overweightness among children worldwide ranges from 10 to 25%, and the prevalence of obesity ranges from 2 to 10% with the Middle East, Pacific Islands, Southeast Asia, and China facing the greatest threat (Hossain, Kawar, and El Nahas, 2007).

Both the human and financial costs of obesity are also mounting. A higher BMI has been shown to account for up to 16% of the global burden of disease, expressed as a percentage of disability-adjusted life-years. In the developed world, 2% to 7% of total health care costs have been suggested to be attributable to obesity (Hossain, Kawar, and El Nahas, 2007). In the USA, costs associated with obesity have been estimated to be around 9% of the total health care costs (Farag and Gaballa, 2011) and in Europe, between 1% and 5% (Webber et al., 2012).

2.3.4 Cost of obesity in Australia

Current and previous research warns of worsening rates of obesity in Australia

with much of the blame attributed to our increasingly sedentary lifestyle (Ng, et.al., 2014; Barr, et al., 2010; Olsen, Dixon, Banwell, and Baker, 2009; Thorp, Healy, Owen, Salmon, Ball, Shaw and Dunstan, 2010; White, Polkinghorne, Atkins, and Chadban, 2010).

The total annual direct cost of overweight and obesity in Australia in 2005 was $21 billion, substantially higher than previous estimates (Colagiuri, Lee, Colagiuri, Magliano, Shaw, Zimmet and Caterson, 2010). In 2005, the total direct cost for Australians aged ≥ 30 years was $6.5 billion for overweight and $14.5 billion for obesity. The total excess annual direct cost due to overweight and obesity (above the cost for normal-weight individuals) was $10.7 billion. Overweight and obese individuals also received $35.6 billion in government subsidies (Colagiuri et al., 2010).

Several more recent studies have attempted to estimate the costs of obesity to the Australian community. For example, Reidpath, Crawford, Tilgner, and Gibb (2012) recently analysed the 1995 *Australian National Health Survey* and concluded that people who fall outside the healthy weight range are more likely to use a range of medical services. Given that the BMI of industrialized populations such as Australia appears to be increasing, this has important ramifications for health service planning and reinforces the need for obesity prevention strategies at a population level. However, prior to this, the Australian Institute of Health and Welfare (AIHW) and the Centre for Health Program Evaluation estimated that the direct cost of obesity in Australia in 1989-90 was $464 million. This was around 2% of Australia's total health care costs at the time. Indirect costs (value of production lost to premature death and absenteeism) were further estimated to be another $272 million, bringing the total cost in 1989-90 to $736 million (ABS, 2009).

This estimate should be considered conservative because not all obesity-related conditions were included in the analysis, such as, the costs of obesity treatment outside the formal health care system. For example, the consumer costs of attending weight control centers in 1989-90, estimated to be more than $500 million a year, were not included. Importantly, it should be noted that because of its close relationship to morbidity and disability, obesity will significantly increase the number of years that an individual suffers from ill health and may add much more to indirect as well as direct health costs.

Thus, maintaining a normal BMI into older age is becoming more important from both an economic and population health perspective, as increased obesity in the older population causes adverse health effects and increases the associated health costs. In recent decades, maintaining a healthy older population has led to the coining of term "successful ageing" (Chodzko-Zajko, Schwingel, and Chae Hee, 2008; Cooper, Powell, and Rasch, 2007; Galloway and Jokl, 2000).

2.3.5 Value of physical activity for healthy and successful ageing

In Australia, attention has been paid to the positive aspects of population ageing. These include the fact that the future aged population may be healthier and wealthier than in the past. Older people also have knowledge and experience to contribute to our society. Moreover, they are more likely to be volunteers, provide care for grandchildren, be law abiding, and to have higher levels of life satisfaction (Healy, 2004). To stay healthy while ageing, it is critical to incorporate exercise and physical activities in daily life. A healthy lifestyle consisting of exercise and physical activity initiates the process of successful ageing (Healy, 2004).

The concept of successful ageing can be traced back to the 1960s, however, it was popularised in the 1980s. In the 1960's Havighurst, (1961) first suggested that successful ageing consisted of three components. Firstly the low probability of disease or disability, followed by maintaining high cognitive and physical functional capacity, and finally sustaining an active engagement with life (Havighurst, 1961).

Recently, Galloway and Jokl (2000) suggested that six dimensions better define successful ageing:

1. No physical disability over the age of 75 as rated by a physician;
2. Good subjective health assessment (i.e. good self-ratings of one's health);
3. Length of life that is not in a disabled state;
4. Good mental health;
5. Objective social support; and,
6. Self-rated life satisfaction in eight domains (marriage, income-related work, children, friendship and social contacts, hobbies, community service activities, religion and recreation/sports).

Developing and maintaining an active lifestyle is becoming increasingly important as technology is negatively impacting on the levels of physical activity that is required to undertake everyday tasks (Sanz, Gautier and Hanaire, 2010). Social and lifestyle choices are leading the population into physically active recreational activities; and social and competitive sports. Walking and bicycling have been identified as key recreational activities by local governments to enhance population health and successful ageing (Ranchod, Roux, Evenson, Sánchez and Moore 2014).

2.3.6 Physical activity interventions

Walking and bicycling are far more common in European countries than in the United States, Australia, and Canada (Bassett, Pucher, Buehler, Thompson and Crouter, 2008). Indeed Bassett et al., (2008) found that active transportation is inversely related to obesity in these countries (Figure 1 over page). Although the results do not prove causality, they suggest that active transportation could be one of the factors that explain international differences in obesity rates.

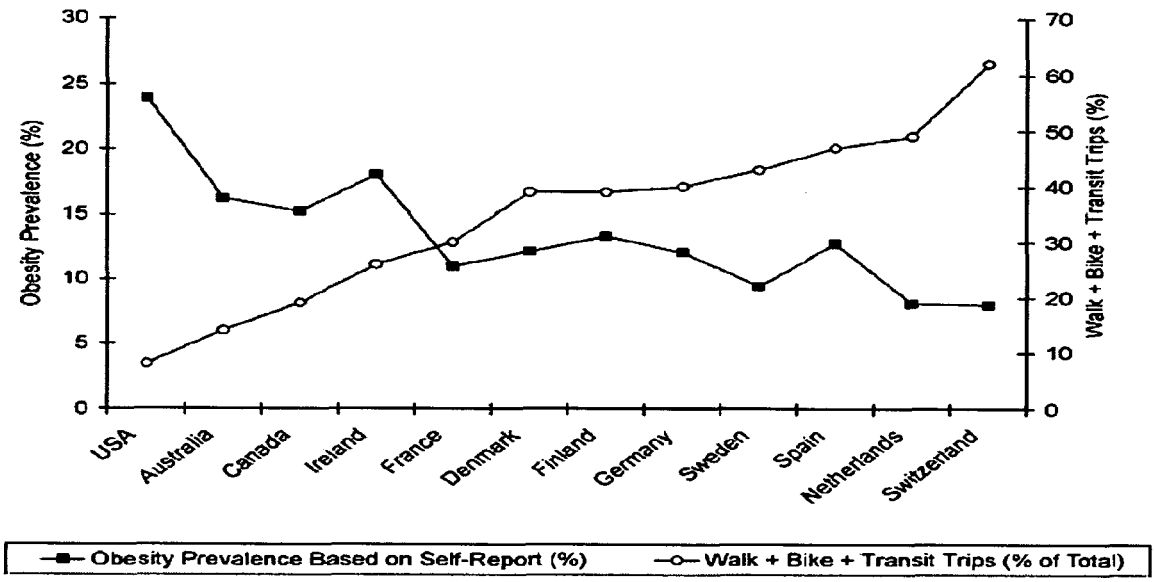

Figure 1: Active travel and adult obesity highlighting the link between cycling and obesity

(Bassett et al. 2008).

Sedentary behavior has been widely identified as one of the leading preventable causes of death (Seguin et al., 2014; Davis, Hodges, and Gillham, 2006; Marcus, Williams, Dubbert, Sallis, King, Yancey... Claytor, 2006). Moreover, an inverse linear relationship exists between volume of physical activity behavior and all-cause mortality (La Guardia and Patrick, 2014; Lee and Skerrett, 2001; Lichtenstein et al., 2006; Worsley, Wang, and Hunter, 2012). Regular physical activity decreases the risk

of cardiovascular disease (Go et al., 2014), type 2 diabetes mellitus (Marrero et al., 2014; Colberg et al., 2010; Peel, Douglas, Parry, and Lawton, 2010), breast cancer (Go et al., 2014; Carmichael, Daley, Rea, and Bowden, 2010), osteoporosis, depression, obesity, colon cancer, and falls in older adults (Kosma ,2014; Landi et al., 2010; Webber et al., 2012; Wolf and Colditz, 2012).

Given the numerous health benefits of physical activity participation, public health guidelines have been published on the recommended volume and intensity of physical activity for healthy adults. In the USA, the *American Heart Association*, the *US Surgeon General*, the *Centers for Disease Control and Prevention* (CDC), and the *American College of Sports Medicine* recommend at least 30 minutes per day of a moderate-intensity physical activity on most, and preferably all days of the week (Davis et al., 2006; Laukkanen, Rauramaa, Makikallio, Toriola, and Kurl, 2011). The *American College of Sports Medicine* and US Surgeon General further state that physical activity should be incorporated into one's everyday lifestyle and that the daily physical activity requirements may be accumulated over the course of the day in short bouts of 10 to 15 minutes.

Within Australia, the public health recommendations related to physical activity are similar to the USA. That is, all adults should engage in at least 30 minutes of moderate-intensity physical activity on most, preferably all-days of the week, with each session lasting at least 10 minutes, and where possible they should also engage in some regular, vigorous activity (Jose, Cleland, Venn, and Hansen 2014). Jose et al. (2014) found that athletes are one of the few sub-groups of the population that consistently achieve or exceed these guidelines and also have detailed records of their weekly physical activities.

For this reason the next section of the review will focus on training habits with an initial focus on young athletes. While there has been a relatively large number of studies that have examined the training habits of young athletes. The review highlights that few studies have examined the training habits of masters athletes compared to elite younger athletes, especially the training practices of masters cyclists.

2.4 YOUNG ATHLETES

2.4.1 Training practices in young athletes

A number of studies have documented the intensity and volume distribution of endurance training in younger athletes. For example, Faria, Parker, and Faria (2005) reported that professional road cyclists train at distances of between 30-35,000 km per year and include different intensities from long slow distance to high intensity interval training in their programs. In a more recent study, Peinado et al. (2011) examined elite male cyclists and different demands of competition coupled with the morphological and physiological characteristics of these cyclists. They investigated three different types of cyclists: flat, hill climbers and all terrain cyclists, and found that in these young cyclists (17-25 years) anthropometric variables provided the best indications of what role each type of cyclist plays in a cycling team. While they reported limited detail on training practices, their training data supported the earlier study by Faria, Parker and Faria (2005). An earlier study by Schumacher and Mueller (2002) used mathematical modeling to predict an average workload of 520 W for every team member for a new team cycling pursuit world record. They reported that the cycling performance was optimized through high overall training distance (29,000-35,000 km per year which is 555-675 km per week) with workload peaking during road stage races such as the *Tour*

de France. Training intensities were monitored through heart rate and lactate field tests during defined training bouts but were not reported in the study.

Few studies have been conducted examining non-elite young endurance athletes training practices. Baker, Cote and Deakin (2005) found through their survey of triathletes that a small proportion of these triathletes were taking advantage of available training methods; a large percentage are not using physical, nutritional, and mental strategies; and were not working with coaching professionals that could aid their training and improve race performance. They also observed, as did Gulbin and Gaffney (1999), that most young triathletes reported regular participation in resistance training.

An early study examined high intensity training in elite cross country skiers athletes who undertake high volume endurance training (Gaskill, Serfass, Bacharach, and Kelly, 1999). During this study, the control group was kept on the same training as the previous year as they had responded well to long slow distance training. The treatment group was given high intensity training as they responded poorly to the previous year's training. The researchers concluded that an increased volume of high-intensity training may improve competitive results in cross-country skiers who fail to respond to increased volume of low-intensity training.

Other previous studies have examined the training practices of younger athletes from a range of different sports. For example, Bradbury (2009) studied the practices of ageing professional baseball players in the USA. They concluded that both pitchers and hitters reached peak performance around 29 years of age. Similarly, Guellich, Seiler and Emrich (2009) analysed 36 young German male rowers (31 international, 5 national junior finalists) with a mean age of 19 years undertaking around 11 training

sessions per week. These young world-class rowers had a total training time consisting of 52% rowing, 23% resistance exercise, 17% alternative training, and 8% warm-up programs. Low-intensity training remained unchanged at approximately 95% of the training volume throughout the season.

The above studies suggest that although there is a clear increase in high intensity training moving from the preparation to competition period of the training season, there is still an emphasis on significant volumes of low-intensity training. The available descriptive studies of the training characteristics of young nationally or internationally competitive endurance athletes training 10 to 13 times per week appear to suggest a typical intensity distribution in which about 80% of training sessions are performed at low intensity (2 mM/L blood lactate), with about 20% dominated by periods of high-intensity work, such as interval training at approximately 90% VO_{2max} (Seiler, 2010).

To date, few studies have examined the training practices of healthy older individuals or masters athletes over the age of 35 years. As the population is ageing, sporting organisations have identified this by offering competitions for the older athletes, known as either masters or veteran athletes.

2.4.2 Ageing and training practices

Both cross-sectional (Marrero et al., 2014) and longitudinal (Lee et al., 2011) studies have demonstrated a decline in aerobic capacity with advancing age in untrained healthy adults. A decline in physical activity is one of the significant causes of deterioration of cardiorespiratory functions (Bortz, 1982). The decreasing level of physical activity during ageing is a universal phenomenon that has a biological basis (Bortz, 1982).

In masters athletes, Pimentel, Gentile, Tanaka, Seals and Gates (2003) found that there was no notable decrease in training volume, cardiovascular fitness or athletic performance up to 50 years of age in well-trained runners. Beyond 50 years of age, each of these parameters began to decline rapidly. However, they also raised questions as to whether their decrements in performance and cardiovascular fitness were caused by decreases in training volume. Furthermore, Fitzgerald, Tanaka, Tran and Seals (1997) examined 900 females from young to old, and sedentary to active, and found no notable decrease in training volume, cardiovascular fitness or athletic performance up to 50 years of age.

The ageing process affects the ability to perform successive training sessions. This is based on recent evidence suggesting that masters athletes may require more recovery time before they can perform another strenuous work (Easthope, Hausswirth, Vercruyssen, and Brisswalter, 2010). Easthope et al. (2010) examined 10 young (30.5 ± 7.0 years) and 13 master (45.9 ± 5.9 years) trail runners and found that there was a significant difference in length of time to return to resting values after training, following a competitive trail running event.

In their earlier study, Young, Weir, Starkes and Medic, (2008b) investigated the weekly training distance in 30 male masters runners (mean age 50.1 years), for all the running training undertaken in the past five years with an average of 62 km per week but indicated that age alone is not the main factor explaining training distance. In an even earlier study Korkia, Tunstall-Pedoe and Maffulli (1994) examined training practices and injury rates in triathletes and found that both female (32.0 ± 7.3 years) and male (34.0 ± 8.9 years) triathletes reported longer cycling distances of 151.7 ± 69.8 km per week and cycling frequency 4.3 ± 2.6 times per week for Olympic

distance triathletes compared to short-course distance triathletes cycling distances of 95.2 ± 69.2 km per week and a cycling frequency 2.8 ± 2.0 times per week. However, any differences between genders or age groups were not reported.

The increased recovery time required may be due to the fact that as we train we cause muscle damage and in the elderly the ability to recover gets slower, thus requiring a longer recovery time before embarking on another training session (Louis, Hausswirth, Bieuzen, and Brisswalter, 2010). Louis et al. (2010) found that taking vitamin and mineral supplementation can significantly reduce recovery time in endurance-trained masters cyclists suggesting that cyclists who are using appropriate recovery strategies may be able to maintain training frequency and distance as they age.

2.4.3 Training practices and health of young cyclists

In a systematic review on the health benefits of cycling, Oja, Titze, Bauman, Krenn, Reger-nash and Kohlberger (2011) reviewed 16 cycling-specific studies. The researchers concluded that there was a positive relationship between cycling and both health and functional benefits in young (9-19 years of age) males and females. For middle-aged (30-55 years of age) to elderly (55-90 years of age) men and woman, the researchers highlighted that there were improvements in cardiorespiratory fitness (risk ratio 0.89) and disease risk factors as well as a significant risk reduction for all-cause and cancer mortality and obesity morbidity in those who rode bicycles regularly. When looking at training practices in these cohorts, they noted that most cyclists trained between 20,000 and 30,000 km per year or 380 – 580 km per week.

In another study Schultz and Gordon (2011) studied recreational cyclists aged 18-61 years and found an odds ratio that indicated that people who cycle 160 km or

more per week are 3.6 times more likely to experience lower back pain as compared to people who cycle less than 160 km per week. Experiencing lower back pain, may lead to a decrease in cycling training therefore causing them to train at a distance under 160 km per week (Schultz and Gordon, 2011).

Faria (2009), when undertaking a review examining specific training practices of young elite cyclists, concluded that the "body of knowledge concerning specific training regimens (practices) for the already trained cyclists remains limited" (p. 16). While Faria (2009) examined young elite cyclists, he acknowledged there is abundant exercise training research evidence applicable to cycling and suggested that future studies are warranted on larger cohorts of already well-trained cyclists such as masters cyclists.

2.5 MASTERS ATHLETES

2.5.1 Masters athlete- Models of successful ageing

Reaburn and Dascombe (2008) highlighted that age-related reductions in endurance performance is primarily rated to age-related decrease in VO_{2max}. They also noted that these age-related decreases in endurance performance and the associated physiological determinants appear to be mediated by a reduction in both intensity and volume of training commonly observed in master endurance athletes.

It is suggested that highly active, well-trained, and competitive masters athletes, rather than sedentary ageing individuals, should serve as a "model population" and the best control group for the assessment of the relative senescence contribution to the age-related functional decline (Tanaka and Seals, 2008). Masters athletes usually continue their training over decades, adhering to training regimes of three to six sessions (about 10 or more hours) per week (Conzelmann, 1993).

In support of this suggestion, Suominen (2011) more recently noted that elite masters track and field athletes with long-term devotion to physical training are challenging present estimates of age-related changes in physiology and performance. Furthermore, they concluded that although the intensive physical training practiced by athletes is beyond the scope of most sedentary older populations, there are lessons that can be learned from the fortunate individuals with good physical inheritance, health habits and motivation to train throughout their lifespan.

In an earlier paper, Spirduso, Francis and MacRae (2005) suggested that masters athletes raise both the physical and psychological ceilings on ageing and shatter the barriers of expectations that society has for the elderly. This was supported by Close, Kayani, Vasilaki, and McArdle (2005) who suggested that, due to their physical and psychological training, an aged person who trained throughout their lifetime will maintain the ability to undertake functional movements and potential protection from exercise-induced muscle damage along with the healthy maintenance of BMI.

Recent results have shown that World Masters Games (WMG) athletes have a BMI more in the range considered normal than for a large comparative population of normal age-matched Australians (Walsh et al., 2011). This finding suggests significantly improved health benefits for masters athletes compared to age-matched Australians (Walsh et al., 2011). However, at the time of the study, cycling was not included in the World Masters Games. In an earlier longitudinal study, Kettunen, Kujaua, Kaprio and Sarna (2006) reported that male masters track and field athletes had a lower risk of chronic diseases and lower BMI than in aged-matched sedentary controls.

Walsh et.al. (2011) also commented on inference, does the sport cause a decrease in BMI or are people with that BMI more likely to undertake the sport initially. With

cycling being a limited weight bearing activity, overweight people are more likely to undertake this activity (Davis, Hodges and Gillham, 2006). With a large number of participants we would expect a normal distribution of BMI.

In spite of this maintenance of healthy BMI in masters athletes, there are age-related declines in performance even though masters athletes strive to maintain or even improve upon the performances they achieved at younger ages. In addition, declines in athletic performance appear inevitable with ageing (Tanaka and Seals, 2008). Decreases in maximal stroke volume, heart rate and arterio-venous O_2 difference all appear to contribute to the age-related reductions in performance in older endurance-trained athletes (Reaburn and Dascombe, 2008). Declines in endurance exercise performance and its physiological determinants with ageing appear to be mediated in large part by a reduction in the intensity and volume of the exercise that can be performed during training sessions (Tanaka and Seals, 2008). However, while a number of previous studies have examined decreases in performance in masters athletes, few studies to date have investigated the training practices of masters athletes, particularly the volume and frequency of training in masters cyclists.

2.5.2 Training Practices of Masters Athletes

The use of masters athletes to describe the age-related decrease in physiological capacities is increasingly common. Taken together, the results of such studies suggest that masters athletes may be able to slow the rate of age-related decline in functional loss (Wright and Perricelli, 2008). For example, Wiswell, Hawkins, Jaque, Hyslop, Constantino, Tarpenning,...Schroeder (2001) examined a group of 146 male and 82 female masters runners over the age of 40 years by gathering medical histories and training records via questionnaire. While no training volume or intensity data was

presented, they were able to use this data to suggest that age-related losses in VO_{2max} may not be different from data previously reported for older sedentary adults and that loss in muscle strength and performance with ageing is not linear (Wiswell et al., 2001). Furthermore, studies by Gulbin and Gaffney (1999) and Lepers, (2008) observed the short training histories (up to 10 years) of masters ultra-endurance triathletes. This suggestion of short training histories in masters athletes is confirmed by Leyk et al., (2009) who examined marathon runners and observed that the majority of the masters athletes had training histories of less than seven years of run training.

More recently, Stiefel, Knechtle and Lepers (2012) found that an increase of training quality may be the reason for performance improvements of masters triathletes with a focus on ultra-endurance disciplines such as male triathletes in the "Ironman Switzerland" from 1995 to 2010 aged between 18-64 years of age. This study suggested that the age-related performance declines were due to decreases in both training volumes and intensity. Importantly, these researchers suggested that the reduced training volumes and intensities were the result of sociological factors such as increased work and family commitments, behavioral factors such as a less intrinsic drive to train hard, and physiological factors such as a longer time needed to recover and a higher risk of injuries (Stiefel et al., 2012). Another important conclusion reached by the same research team was that the specificities of cycling, including improvements in equipment design, compared with the other two triathlon disciplines (running and swimming), may explain the lower age-related decline in cycling performance even though the training volume decline in cycling was at a similar rate to running and swimming. Earlier research by the same group examined training practices of Ironman triathletes with a focus on training time (Knechtle, Knechtle, Rosemann, and Senn,

2011). They observed Ironman triathletes training 14 hr training per week (2.4 hr for swimming, 6.7 hr for cycling, and 4.7 hr for running). In comparison, half marathoners spent 14.7 hr per week (Knechtle, Wirth, and Rosemann, 2010) and 100-km ultra-runners spent 17.4 hr per week running (Knechtle, Knechtle, Rust, and Rosemann, 2011).

In an earlier study, Gulbin and Gaffney (1999) examined the relationship between training practices and performance of the athletes in an Ironman competition. They found that training distances/week for swimming, cycling and running, were 8.8 ± 4.3 km, 270 ± 107 km, and 58.2 ± 21.9 km. They concluded that training distances were more important that training pace and that training distance could actually be less than previously reported to be required to finish a Ironman triathlon. More recently, Knechtle, Knechtle, Rust and Roseman (2011) examined the training practices of the top 10 finishers in each age group in an Ironman competition. Both these previous studies concluded that both a large training volume and a high training intensity are required for successful performance in Ironman competition. In the light of this analysis, it has been suggested that masters athletes should optimize their quality of training by reducing their training volume to save time for adequate recovery and remain free from injuries (Ransdell, Vener, and Huberty, 2009).

In a more recent study examining overuse injuries Wroblewski, Amati, Smiley, Goodpaster and Wright (2011) reported that total number of kilometres in the runners' lifespan may be the cause of a higher risk for overuse injuries, therefore leading to a decrease in training practices in athletes as they age.

In the most recent study on training practices of male, runners and power athletes, aged between 20 and 90 years of age, Kusy and Zielinski (2014) found that

weekly training volume was a significantly and positively related to age-related changes in aerobic capacity. There was positive cardiac adaptation accounting for between-group differences with the younger athletes from the strength-power and endurance runners groups training about 13 hours and 18 hours per week, respectively. The amount of training decreased relatively rapidly between the ages of 20 and 40 years which then stabilized at the level of 6–8 hours per week over the age of 40 years.

In summary, the world population is aging along with BMI across the world increasing especially within Australia. This is identified as a concern as BMI over 25 is associated with increase disease risk. One of the few models where BMI is lower in a specific population is endurance masters athletes. Furthermore there is we limited studies undertaken on masters athletes and these have found age effects with a decrease in training practices and an increase in BMI, these have predominately been with sports that have high impact such as running. Generally they found no effect of gender on training practices in young or older athletes specifically when looking at endurance athletes. Researchers have investigated young cyclists reporting training distances over 400km per week and a frequency of around 6 times a week with normal range BMI. While earlier studies have examined the current training practices of masters athletes from running, swimming and triathlons, to date no study has examined the training practices of masters cyclists.

CHAPTER 3: METHODS AND STATISTICAL PROCEDURES.

3.1 METHODS.

The present project used a mixed methods approach and thus a combination of both the qualitative and quantitative data collection (Christensen, Johnson, and Turner, 2011). Phase one used the focus group technique to develop the online survey tool which was used to examine the current training practices of masters cyclists. Phase two of the research project comprised the online survey that was designed to gather quantitative data examining the training practices of masters cyclists.

3.1.1. Focus group.

Following ethical approval from the CQ University Human Ethics Research Panel (Approval number 12-06-135) (Appendix A, page 79), an email invitation was sent to 10 local male and female masters cyclists from the Rockhampton Cycling Club asking them to participate in a focus group session designed to develop and refine an online questionnaire. Each participant received an invitation, an opt-in option, an information sheet and an informed consent document, giving the date, time and venue of the focus group. Each potential participant who responded to the e-mail invitation was then sent an email seven days before the planned focus group as a reminder and then again on the day of the focus group meeting. Refreshments in the form of sandwiches, coffee, tea and juice were provided to the participants.

Upon arrival at the venue, the signed informed consent form was collected from the participants. Participants were seated around a meeting table in a meeting room at CQ University. A series of open and closed questions were asked to initiate and facilitate discussion between the focus group participants (Appendix B page 103). The focus group was recorded following consent of the participants who again were

reminded of the opt-in nature of the research and informed that if they wished to leave the meeting at any stage there was no penalty or prejudice.

This technique of using a focus group to help ensure the accuracy of the online survey questions therefore there was no need for a thematic analysis using nVIVO analysis. The sole purpose of the focus group was to rest the clarity of the questions used in the online survey. This was an important step to help with the development of a new survey that asks questions on a specific populations training practices. A draft survey tool was presented to the focus group participants and each section and question presented in turn for feedback and comment. In particular, the participants were asked to comment on the readability of each question and the appropriateness of the type and number of response options.

The feedback from the focus group informed the structure and wording of the final online survey questionnaire that was part of a much larger research project examining barriers and constraints to training in masters athletes as well as recovery practices.

3.1.2. Online questionnaire.

The research project received the written support of *Cycling Queensland* who provided their permission to send the online survey link to their 2012-13 membership e-mail database. Following ethical approval from the CQ University Human Ethics Research Panel (Appendix C, page 107), an email was sent by *Cycling Queensland* to all current members inviting them to participate in the research. Each participant received in the email an invitation, an opt-in option, and a hyperlink to the online questionnaire using *Survey Monkey*. The survey asked specific questions examining both their current training practices and demographic details including age, gender, and height (Appendix D, page

126). The individual agreed to participate by providing consent after reading the informed consent on page one of the questionnaire. *Cycling Queensland* also sent all members a second reminder email two weeks after the first e-mail, reminding them to participate in the online questionnaire. The second e-mail also stated a survey closing date to encourage immediate participation. A total of 264 responses were received, with 208 being completed fully with a response rate of 19% of *Cycling Queensland* masters members. The estimated time to complete the online questionnaire was 20 minutes and included recovery practices, and perceived benefits and constraints for participating in cycling in Queensland.

Online questionnaire relevant questions are listed below.

- What is your age at the time of this online questionnaire?
- Gender (male or female)?
- What is your height in cm?
- What is your weight in kg?
- Over the past 12 months, as an average per week, please indicate

- Training per week for cycling?
- Average km per week on the bike?

3.2 STATISTICAL PROCEDURES.

3.2.1. Software package used.

Once the online questionnaire access expired, the responses were downloaded. Data was analyzed using Statistical Package for the Social Sciences (SPSS) software (v20.0, IBM Corporation; Armonk, NY, USA). Data was checked for distribution of normality using Shapiro-Wilk and normally distributed data were presented as means ±

standard deviation. The SPSS output results are detailed in Appendix E (page 148).

3.2.2. Statistical analysis.

Descriptive values (mean and standard deviation) for each variable were determined and inferential (unpaired - Student's t-Tests and One-way ANOVA) statistical analyses were undertaken (see - Appendix E – 148) to examine the effects of gender and age on training distance and training frequency per week together with BMI in masters cyclists.

The Shapiro-Wilk test was undertaken for normality as the data set was under 2000 subjects, for age, weight, height, training distance per week and weekly training frequency. All variables were found to have a p value above 0.05 therefore confirmed normality (Triola et.al., 2006). All data was also checked with a histogram to confirm the above findings (Triola et.al. 2006).

An alpha level of 0.05 was accepted as showing statistical significance. The level 0.05 was chosen as the data was normally distributed and therefore any significant change would be at the 95% confidence level.

There were 264 individual responses entered into Survey Monkey. However, 56 of these responses were incomplete and were removed from the data set. Thus, a total of 208 responses were statistically analysed.

Due to the limited number of responses from females in each age group, no statistical analysis was undertaken for gender differences within each age group for training distance, training frequency or BMI.

CHAPTER 4: RESULTS.

4.1. DEMOGRAPHICS.

Table 3 shows the demographics for height in centimeters and weight in kilograms along with age in years for each of the cohorts that were analysed, namely gender and age group. The total number of individuals in each group are represented in brackets. There were a total of 208 individuals that fully completed the on-line questionnaire.

Table 3

Characteristics of respondents by age and gender

Category		Height (cm)	Weight (kg)	Age (years)
Gender	Male (n=181)	184.2±3.3	84.2±0.2	49.2±12.4
	Female (n=27)	163.3±12.2	60.1±0.2	43.3±17.9
Age Group	35-44 (n=91)	185.4±3.1	83.8±0.2	42.4±2.7
(years)	45-54 (n=65)	181.1±2.5	81.0 ±0.1	50.6±2.3
	55+ (n=52)	179.4±3.1	78.7±0.3	64.7±6.7

4.2. TRAINING DISTANCE OF MASTERS CYCLISTS.

Figure 1 below shows the mean and standard deviation (M±SD) in training distance (km) cycled per week of masters cyclists for both genders and each age group. A Student's t-test revealed no effects of gender on distance cycled per week [$t(207)=-0.30$, $p=0.76$]. One-way ANOVA revealed no effects of age on distance (km) trained per week [$F(2,205)=0.25$, $p=0.78$].

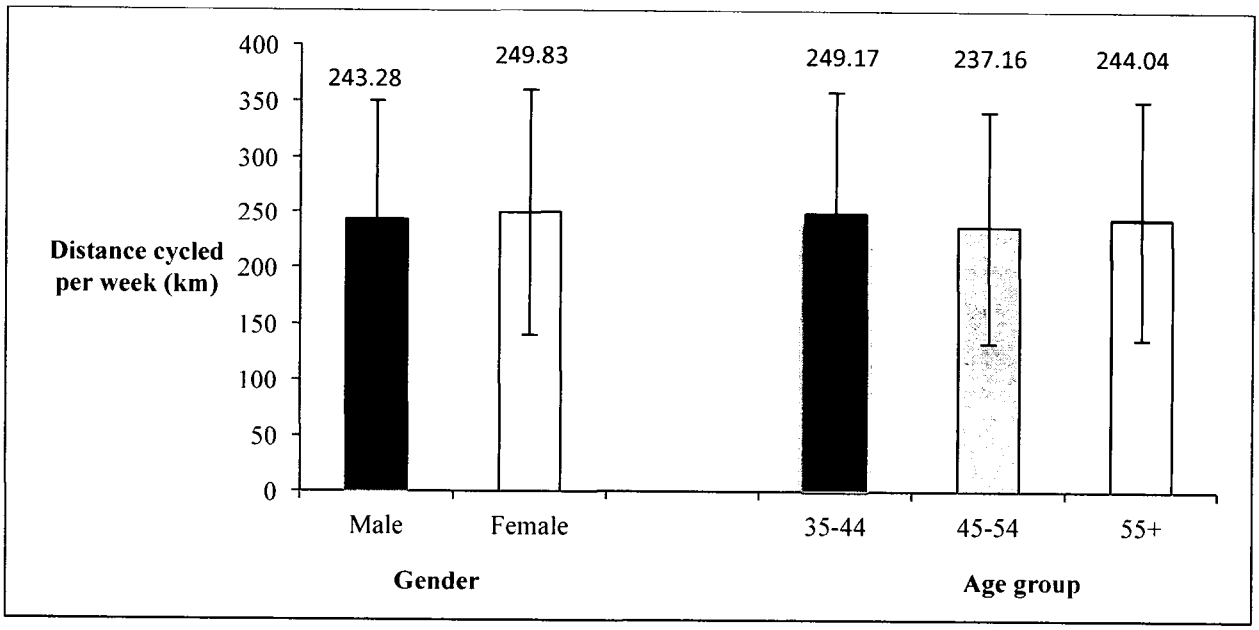

Figure 2: Mean (±SD) distance (km) cycled per week for male and female masters cyclists in three age-groups.

When analyzing the above results in relation to our research hypotheses with the focus on training distance, we can confirm that our research hypothesis of there being no effect of gender on distance of training per week for masters cyclists in Queensland was proven correct. However, even though the literature lead to the research hypothesis that there will be an effect of age on distance of training per week for masters cyclists in Queensland, our results have shown this hypothesis to be incorrect. The present data suggest no effect of age on distance of training per week for masters cyclists.

4.3. TRAINING FREQUENCY OF MASTERS CYCLISTS.

Figure 2 below shows the mean and standard deviation (M±SD) of training frequency of masters cyclists per week for both genders and each age group. A Student's t-test revealed no effects of gender on training frequency per week [$t(207)=-0.47$, $p=0.64$]. One-way ANOVA revealed no effects of age on training frequency per week [$F(2,205)=0.83$, $p=0.43$].

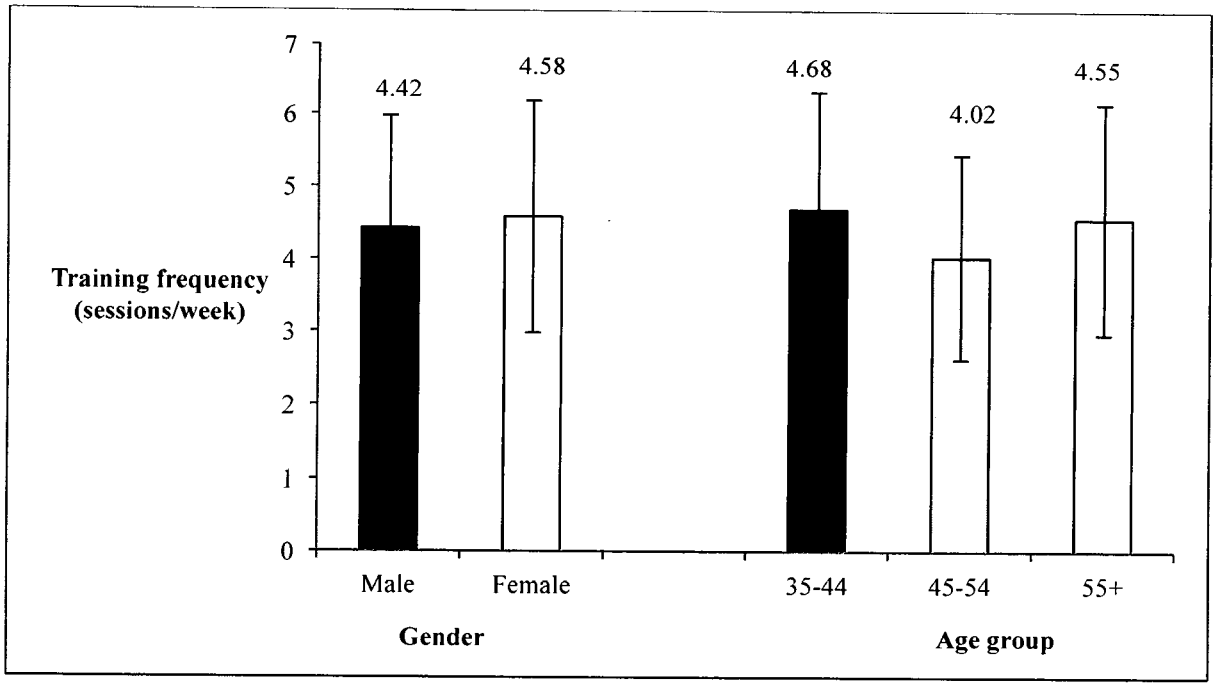

Figure 2: Mean (±SD) training frequency per week for male and female masters cyclists in three age-groups.

When analyzing the above results in relation to our research hypotheses with the focus on training frequency we can confirm that our research hypothesis of there being an effect of gender on frequency of training per week for masters cyclists in Queensland was not proven. Furthermore, even though the literature lead to the research hypothesis that there will be an effect of age on distance of training per week for masters cyclists in Queensland, the present results suggest this hypothesis to be incorrect. We observed no effect of age on distance of training per week for masters cyclists.

4.4. BODY MASS INDEX (BMI) OF MASTERS CYCLISTS

Figure 3 below shows the mean and standard deviation (M±SD) of BMI in masters cyclists for both genders and each age group. A Student's t-test revealed a significant difference in BMI [$t(207)=4.08$, $p<0.01$] with females (22.6 ± 2.9) displaying lower BMI compared to males ($M=24.9 \pm 2.6$). One-way ANOVA revealed no effect of age on BMI [$F(2,205)=0.12$, $p=0.8$].

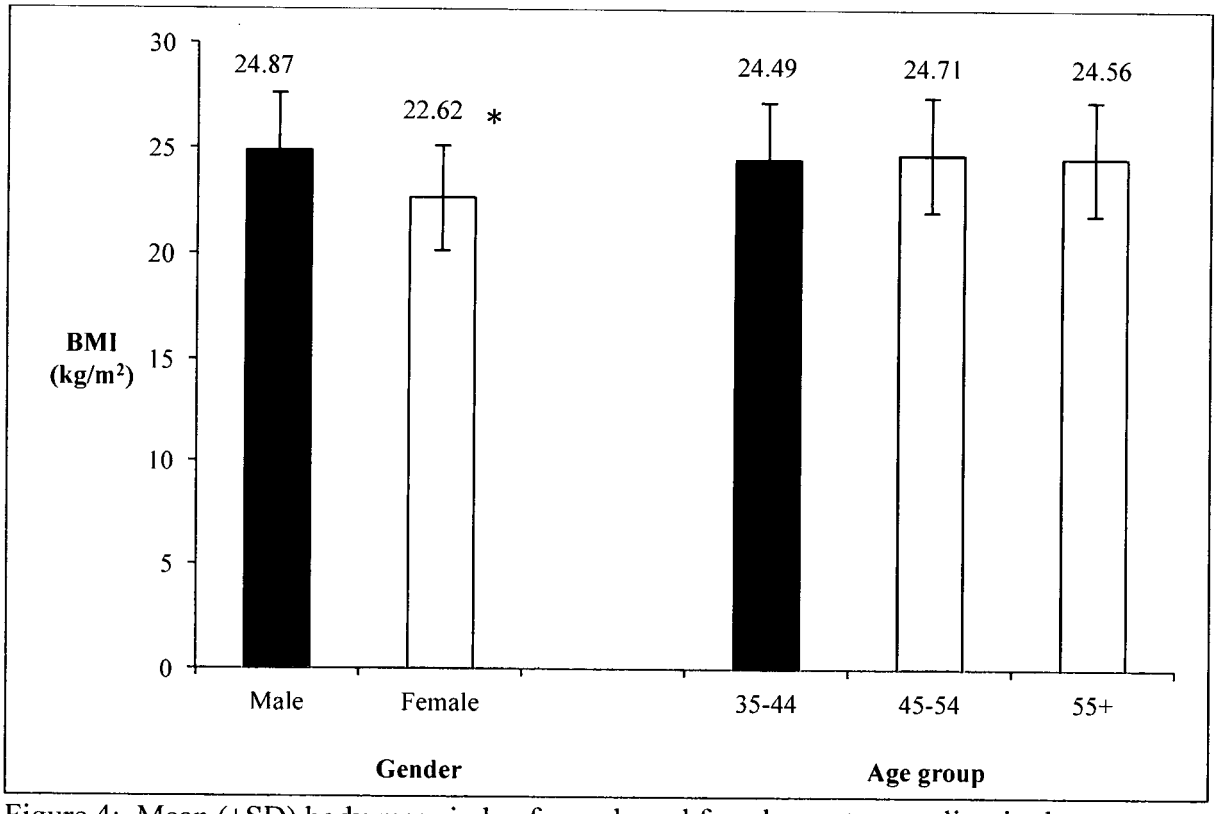

Figure 4: Mean (±SD) body mass index for male and female masters cyclists in three age-groups.

* Significant difference between genders $p<0.05$

When analyzing the above results in relation to our research hypotheses with the focus on BMI we can confirm that our research hypothesis of there being an effect of gender on body mass index of masters cyclists in Queensland was proven. However the literature lead us to research hypothesis that there will be an effect of age on BMI of

masters cyclists in Queensland, our results have shown this hypothesis to be incorrect, therefore no effect of age on distance of training per week for masters cyclists.

4.5. SUMMARY OF RESULTS

In summary, the above results have supported our research hypotheses when examining the effect of gender on training distance, frequency and BMI. No significant differences were found between genders for weekly training distance and frequency. However, a significantly lower BMI was found in female masters cyclists compared to male masters cyclists. In relation to age effects for weekly training distance and frequency changing and BMI, the present results did not support our research hypotheses with masters athletes maintaining their training distance, training frequency and BMI as they aged.

These results will now be discussed by comparing and contrasting with previous relevant research.

CHAPTER FIVE: DISCUSSION

5.1 INTRODUCTION

The current chapter presents a discussion on the results of the present study that examined the effects of gender and age on training distance, training frequency and BMI (body mass index) in masters cyclists. A comparison will be made between the findings of the current study and those of previous studies. The chapter concludes with a summary of the major findings of the study.

5.2 THE EFFECT OF GENDER AND AGE ON TRAINING DISTANCE

This section will discuss the effect of gender and age on training distance as observed in the present study and then compare these findings with those from earlier studies.

5.2.1 The effect of gender on training distance

The findings of the present study showed no significant effect of gender on training distance in male and female masters cyclists. The present study observed a total training distance per week for Australian masters cyclists of 243.3 ± 107.4 km for males and 250.0 ± 85.2 km for females. While no research to date has examined training distances in male and female masters cyclists, Enosken, Tjelta and Tjelta (2011) studied six international level long-distance runners (3 male and 3 female). While the age of the runners was not specified in the study, a note made in the discussion suggests all the runners were approximately 25 years of age. They observed no significant difference in running distance per week between male (170-250 km per week) and female (180-230 km per week) long-distance runners. Thus, like the current finding, it appears that it is appropriate for both genders to train similar distances as part of their training regimes.

5.2.2 The effect of age on training distance

The findings of the present study suggest no effect of age on training distance. The participants in the present study were divided into three age groups: 35-44 (n=91), 45-54 (n=65) and 55+ (n=52) years. The observed cycling training distance per week for each group was: 35-44 years 249.8 ± 111.7 km; 45-54 years 237.7 ± 106.7 km; and for 55+ years was 244.0 ± 89.4 km. These results suggested that age does not appear to have any significant effect on training distance of masters cyclists over 35 years of age.

There have been a number of previous studies investigating the effects of age on training distance in masters athletes. Previous researchers have reported equivocal results when examining the effects of age on training distance. However, the investigations revealed that age was not the major factor affecting the training distance of masters athletes. For example, Pollock, Mengelkoch, Graves, Lowenthal, Limacher, Foster and Wilmore (1997) examined 24 older male masters track endurance runners (50.5 ± 8.5 years) longitudinally and observed a significant decrease in training miles per week over a period of 20 years from the initial 32.8 ± 23.8 miles (52.8± 38.3 km) down to 18.2 ± 11.7 miles (29.3±18.8 km) per week. Pollock et al. (1997) also studied the training intensities in the same athletes and found that the athletes training at high and moderate intensity had a significant decrease in the training distance per week as compared to the low intensity group. This finding suggests that older competitive athletes may train less in distance but to maintain performance, they train at a higher intensity.

In contrast, an earlier study by Pollock, Foster, Knapp, Rod, and Schmidt (1987) investigated 25 masters track athletes (50-82 years) and reported that there was no change in training distance over a 10-year training period. However, they did report that the training intensity decreased for half of the group (high to moderate) due to them no

longer competing at a high level. In the light of these previous studies and those of the present study, it might be suggested that age does not have a direct effect on training distance per week in masters athletes.

Similarly, Young, Medic, Weir and Starkes (2008a) studied age-related performance changes in masters runners and found that competitive runners did not train continuously into older age. However, they did not report on the actual training distances of the older runners. In another study by the same research group, it was found that other training variables explained more variance in performance than age alone (Young, Weir, Starkes and Medic, 2008b). In their study, Young et al. (2008b) investigated the weekly training distance for all the running done in the past five years with an average of 62 km per week. For these runners they found that the amount of weekly running was strongly associated with performance, with a significant and negative correlation ($r = -0.68$) between age and weekly running distance. It was concluded by these researchers that the quantity of masters athletes' training at the time of their performance/competition could account for the individual differences in their performance. In summary, these findings suggest that age does not have a significant effect on training distance but may have a negative effect on performance with factors other than age being suggested to contribute to a decline in training distance per week as masters athletes age.

More recently, Schultz and Gordon (2011) studied recreational cyclists aged 18-61 years and found an odds ratio that indicated that people who cycle 160 km or more per week are 3.6 times more likely to experience lower back pain (LBP) as compared to people who cycle less than 160 km per week. Both groups had distinct training characteristics. For example, cyclists with LBP trained distances of 250 ± 131 km/week while those with no-lower back pain trained significantly less at 150 ± 135 km/wk. This finding again suggests that factors other than age, such as LBP, may affect the training

distance covered per week in masters cyclists.

Similarly, Korkia, Tunstall-Pedoe and Maffulli (1994) examined training practices and injury rates in triathletes and found that both female (32.0 ± 7.3 years) and male (34.0 ± 8.9 years) triathletes reported longer cycling distances (151.7 ± 69.8 km per week) and cycling frequency (4.3 ± 2.6 km per week) compared to short distance triathletes cycling distances (95.2 ± 69.2 km per week) and cycling frequency (2.8 ± 2.0 per week). While they did not examine difference between genders or age groups, this finding supports the present study's finding that age may not directly affect training distance per week in masters cyclists but other factors such as training intensity, injury risk and event specificity may be more important in determining weekly training distances than age alone.

Considering the above factors affecting training distance, it might also be suggested that another factor affecting training distances per week may be that overuse injuries have been reported to be significantly higher among runners who run more than 2600 km per year (around 50 km per week) during training (Wroblewski, Amati, Smiley, Goodpaster and Wright, 2011). Wroblewski et al. (2011) also observed that the total number of kilometres in the runners' lifespan may be the cause of a higher risk for overuse injuries. They reported that runners with more than 10 years of experience also had a significantly higher risk for overuse injuries of the back (3.2 times greater) as well as Achilles tendinopathy (2.8 times greater) than runners who have trained for less than 10 years, which was also supported by Longo et al. (2009).

Furthermore, it is widely acknowledged that the "dose" of exercise consists of a number of factors including intensity, duration, and frequency. For example, a greater frequency of exercise and a greater training distance per week are both associated with a greater VO_{2max} (Gates, Tanaka, Graves and Seals, 2003). In short, it appears that the

masters runners who have higher training distances per week are at an increased risk of associated overuse injuries which affect their running distances trained per week. This suggests that running distance per week is more affected by injuries than by age. The same may apply to the current study where there could be an age-related increased risk of overuse injuries which may affect training distance.

When comparing and contrasting the training habits of cyclists versus ironman athletes, Rüst, Knechtle, Knechtle, Wirth and Rosemann (2012) examined the training distances covered in both ultra-cyclists and ironman triathletes. The cyclists undertook 12.7 ± 6.4 hours per week of cycling training compared to 7.0 ± 2.3 hours per week cycling for the Ironman triathletes. However, the number of total training hours was significantly higher in Ironman triathletes at 14.1 ± 5.7 hours per week. With the increase in hours cyclists had on the bike, they covered significantly more kilometers per week (354.5 ± 181.8) compared to the ironman triathletes (189.5 ± 70.2). Comparing Rust et al. (2012) study to the current research, two observations might be made. Firstly, the distance travelled by masters cyclists is similar to that covered by the ultra-cyclists in the Rust et al. (2012) study; and secondly, based on the large standard deviations in both studies, there was a large variation in training distance covered in both the present study and that of Rust et al. (2012).

In summary, the present results suggest that masters cyclists are able to train at relatively long distances even into older age as the effects of this cycle training on injuries appear to be limited compared to those observed with running (Koller et al. 1998).

5.3 THE EFFECT OF GENDER AND AGE ON TRAINING FREQUENCY

This section will discuss the effects of gender and age on training frequency and

compare the findings of the current study with relevant previous studies.

5.3.1 The effect of gender on training frequency

The present results suggest that there was no effect of gender on training frequency in masters cyclists. The data showed that male masters cyclists trained 4.3 ± 1.6 times a week, while the female master cyclists trained 4.5 ± 1.7 times per week. Enoksen, Tjelta, and Tjelta (2011) examined internationally competitive endurance runners (both marathon and track runners) and reported training frequency per week of 13.0 ± 1.0 during the preparation period and 12.0 ± 2.0 for the pre-competition and competition training period with no significant difference between male and female runners. A more recent study by Wroblewski et al. in 2011 on overuse injuries in iron-distance triathletes found that the mean number frequency of training sessions per week for the 174 subjects (both male and female) was 11.1 ± 0.5. Both these studies support the finding in the present study that gender does not appear to have any significant effect on training frequency in endurance athletes such as those examined in the current study.

Historically, Garcin, Flury, Ansart, Mille-Hamard and Billat (2006) compared young male (19.0 ± 3.0 years) endurance runners to young female (19.1 ± 1.7 years) endurance runners. They concluded that even though males (4.0 ± 0.9 sessions per week) had a higher but non-significantly different number of training sessions per week, females (3.6 ± 1.3 sessions per week) made up for this non-significant lower number of training sessions per week with higher intensity training. Furthermore, although Knechtle, Wirth, Baumann, Knechtle, Rosemann and Oliver (2010) did not record the actual number of training sessions per week for male (30.3 ± 9.1 years of age) and female (36.6 ± 7.0 years of age) triathletes, they did not find any significant difference in the amount of training hours of 14.8 ± 3.2 hours per week and 13.9 ± 3.4 hours per

week, respectively. Taken together, these earlier studies support the current study's findings that gender does not appear to have any effect on training frequency in either young male and female endurance athletes or masters cyclists.

5.3.2 The effect of age on training frequency

The findings of the current research suggest that age does not have any significant effect on training frequency in masters cyclists. In order to examine the effect of age on training frequency in masters cyclists in the present study, a comparison was made between the training frequency of three age groups. There was a small but non-significant decrease in training frequency in the age group 45-54 years (4.3 ± 1.4 times per week) as compared to both the 35-44 years (4.7 ± 2.0 times per week) and 55+ years (4.6 ± 1.1 times per week) age groups. The reason for decrease in training frequency in the 45-54 years age group may be attributed to reasons other than age such as work and family commitments.

Venter, Potgieter and Barnard (2010) found that lack of time, which may included the previously discussed lifestyle factors, effected the quality of training and recovery practices undertaken in younger athletes that were involved in team sports. It might be suggested that masters athletes involved with an endurance sport such as cycling which demands not only time 'in the saddle' but also have work, spouse and family time commitments that previous research has identified constrain their commitment to masters sport (Cardenas, Henderson and Wilson, 2009; Young and Medic, 2011). The benefits for athletes to find time to undertake training were identified by Cardenas, Henderson and Wilson (2009) who examined athletes over the age of 55 years identifying one of the main reasons for participation in sport as being physically active and healthy with the study participants being over two times as active as the

general population. In a later study Young and Medic (2011) examined masters swimmers, and found that not having support of children or family, effected the amount of training time available to the masters swimmer.

In a recent study conducted by Carrick-Ranson, Hastings, Bhella, Fujimoto, Shibata, Palmer and Levine (2014), slightly higher training frequencies were reported ranging from 6-7 times per week in a wide range (running and swimming) of national and international masters athletes but lower for casual (3 times per week) and committed exercisers (4-5 times per week). However, Carrick-Ranson et al. (2014) defined masters athletes as over the age of 25 years which may explain the higher training frequency given that younger masters athletes may not be restricted by family and/or career commitments. In the light of Carrick-Ranson et al., (2014) findings, family commitments might be considered an important factor affecting the non-significant but lower training frequency of the 44-54 years age group in the current study.

In a classic longitudinal study of the effect of ageing in male recreational runners over a period of 33 years, Kasch, Boyer, Schmidt, Wells, Wallace, Verity and Schneider (1999) reported 3.0 ± 0.6 sessions per week at 45.0 ± 6.5 years of age which increased up to 4.6 ± 1.3 over the next 33 years at 76.1 ± 5.7 years of age. These training frequencies are similar to those observed in the present study for both male and female masters cyclists. Taken together, it might be suggested that masters athletes have limited time to train compared to younger and older masters cyclists as a result of increased work and family commitments.

In a similar study, Seiler (2010) observed that young nationally or internationally competitive endurance athletes train 10 to 13 times per week to maintain a high level of fitness that allows them to compete at high levels. Similarly, Billat, Demarle, Slawinski, Paiva and Koralsztein (2001) also found that young high performance marathon runners

train between 10–14 times per week. Both these earlier studies highlight that young elite athletes engage in more regular training than masters runners because of the availability of more time due to fewer or no family and work commitments.

In summary, the present findings suggest that masters cyclists are able to train regularly but at levels lower than those observed in younger cyclists or endurance athletes with less or no family or work commitments. Thus, the findings of the current study support the hypothesis of no gender or age effects on the frequency of training sessions per week in masters cyclists.

5.4 THE EFFECT OF GENDER AND AGE ON BMI

In this section the current study's findings on the effects of both gender and age on BMI of masters cyclists will be discussed and compared with the findings of earlier studies. The discussion begins with a sub-section on the effect of gender on BMI followed by a sub-section on the effect of age on BMI of masters cyclists.

While BMI is a common measure for defining whether a person is underweight, normal weight, overweight or obese (ABS, 2013b) and is defined as the weight in kilograms divided by the square of the height in meters (kg/m^2). Over the last two decades, a steady upward trend in the number of people in the Australian population with higher BMI values has been observed, driven mainly by increases in body weight (ABS, 2013a).

Body mass index for male and female master cyclists place the grouped athletes within the "normal range" for the adult population, therefore they have less risks of diseases associated with obesity. The maintenance of this level of body mass index as they aged is against reported data (ABS 2013a) for the general population and therefore we can conclude that the activity of competitive cycling may help aging cyclists age successfully.

Stewart and Hannan (2000), when undertaking a cross-sectional study with runners, cyclists and controls, found were no differences in age, height, weight, body mass index (BMI), % fat, or hours of training between the two athletic groups ($P > 0.05$), although compared with controls, runners and cyclists had lower body mass index ($P < 0.01$) and all athletic groups had lower % fat ($P < 0.001$). Compared with controls, runners had greater total and leg BMD ($P < 0.05$), cyclists had reduced spine BMD ($P = 0.05$), and athletes of the "both" group had greater total ($P < 0.05$) and arm BMD ($P < 0.01$). Running is associated with increased bone density, particularly in the leg, whereas cycling is associated with a mild decrease in bone density in the spine.

Campos et.al. (2006) reported the relative risks associated with underweight (BMI < 20) were greater than those associated with even high levels (BMI > 35) of obesity. Milic et.al. when studying glomerular filtration rates some athletes with a low BMI (ie cyclists) have serum creatinine concentrations lower than non-physically active subjects, whereas, athletes having a high BMI (ie rugby players) demonstrate high concentrations of this parameter. This highlights that masters cyclists while maintaining a lower BMI as they age, however they may also be at a risk of having a BMI under the normal range, which has some implications on kidney and other diseases (Campos et.al. 2006).

Hu et.al. (2004) investigated over 18,000 Finnish men and women aged 25–74 years without history of coronary heart disease, stroke, or heart failure at baseline. They then followed the individuals for 10 years and observed that BMI was a better predictor of CVD than waist circumference or WHR. Hu et. al. (2004) also concluded that physical activity had a strong, independent, and inverse association with CVD risk in both genders. This suggest that both regular physical activity and normal weight can reduce the risk of CVD. Physical inactivity seems to have an independent effect on CVD

risk, whereas obesity increases the risk partly through the modification of other risk factors (Hu et.al. 2004). Therefore the findings of this current study of maintenance of BMI as they age may lead to a reduced risk in CVD in this masters cyclists cohort.

5.4.1 The effect of gender on BMI

The current data suggest a significant difference in BMI between male and female masters cyclists. It was found that female cyclists exhibited a significantly lower BMI (22.9 ± 3.0) as compared to that of male (24.9 ± 2.6) masters cyclists ($p<0.001$). In a media release by the Australian Bureau of Statistics (ABS, 2013b), it was reported that in a normal Australian population, adult male overweight rates (69.7 %) are higher than female rates (55.7%), whereas the obesity rates were the same (both 27.5%) for men and women across all age groups. According to the ABS (2013b) report, the average Australian male's weight has increased 3.6 kg., whereas the weight of an average woman has had an increase of 4.0 kg between the time period of the year 1995 to 2011-12. The ABS statistics concern the general population, whereas the current study participants were masters cyclists who train on regular basis, hence the difference in the results of the BMI values of masters cyclists found in the current study and the values reported by ABS for normal Australians.

A large study of World Masters Games athletes in football team sports (rugby union, football/soccer and touch rugby) was undertaken by Walsh, Climstein, Heazlewood, Burke, Kettunen, Adams and DeBeliso in 2011. Walsh et al. (2011) also observed a gender difference in BMI amongst their masters athlete participants. They reported that the incidence of BMI ≥30 was significantly higher in males (14.5%) than in females (7.3%). Even after taking out the rugby union players where a higher percentage of rugby players were male and had a higher BMI, there still remained a gender effect in

BMI of team-playing masters athletes. Thus, it can be seen that gender does have an effect on BMI in masters athletes.

Cycling has been observed to improve BMI, with a number of previous studies (Østergaard, Grøntved, Børrestad, Froberg, Gravesen and Andersen, 2012; Korkia, Tunstall-Pedoe and Maffulli, 1994) observing that cycling improves numerous health-related factors including the risk of cardiovascular disease and diabetes. It is assumed that the participants in the current study would also have had gained health benefits from cycling due to their relatively low BMI. Korika et al. (1994) found that female triathletes (32.0 ± 7.3 years of age) have a lower BMI (20.9 ± 1.8) as compared to similarly-aged male (34.0 ± 8.9 years of age) triathletes who had a BMI of 22.6 ± 2.8. The study done by Korika et al. (1994) on triathletes supports the finding of this study related to the significantly greater BMI of male cyclists compared to the female cohort.

In the light of these earlier studies and the findings of the current study, it might be concluded that gender does have a significant effect on BMI of masters cyclists, with female masters cyclists exhibiting a significantly lower BMI compared to male masters cyclists.

5.4.2 The effect of age on BMI

The present results suggest that there is no effect of age on BMI in masters cyclists with similar BMI observed in each age group when both genders were combined. The BMI across the three age groups in this study was found to be 24.5 ± 3.1 for the 35-44 years age group; 24.7 ± 2.8 for the 45-54 years age group; and 24.6 ± 2.0 for the 55+ years age group. These findings suggest no significant difference in BMI across the three age groups.

These results are in contrast to the trend in the normal Australian population

where the ABS (2013a) has reported that the rates of overweight/obesity are higher in older age groups. According to the ABS report (2013b), 74.9 % of Australian people aged between 65-74 years are either overweight or obese as compared to the lower overweight and obesity ratio of 36.4% observed in younger people between 18-24 years. The lower BMI of the masters cyclists in the present study might be attributed to the regular physical training to maintain fitness and health into older age.

The findings of a similar study on masters athletes conducted by Pollock, Mengelkoch, Graves, Lowenthal, Limacher, Foster and Wilmore (1997) supports the current study's finding related to the effect of age on BMI. Pollock et al. (1997) conducted a 20-year longitudinal study of older track athletes and observed no significant difference in body composition as participants aged, supporting the current study's finding that age does not appear to affect BMI in masters athletes who remain physically active as they age.

In their recent study on the effect of age on BMI of runners/track and field athletes, cyclists and swimmers, Wroblewski et al. (2011) suggested several reasons as to why age might not affect BMI in masters athletes. They concluded that there is the possibility of maintenance of muscle mass with increasing age by undertaking regular exercise and a healthy diet to maintain a lower BMI as these sportsmen age. This supports the current study's finding that there is no effect of age on BMI in masters cyclists.

In contrast, an earlier study undertaken by Pimentel, Gentile, Tanaka, Seals and Gates (2003) examined BMI of endurance-trained male runners across a large age range (20-90 years). The study showed a significant age-related increase in BMI from the age of 20 years (22.7 ± 0.4 kg/m^2) through the age of >60 years (24.2 ± 0.6 kg/m^2). However, within the Pimentel et al. (2003) study they observed a significant age-related

decrease in both training frequency and training volume suggesting that this decrease in training volume per week was the major reason for the increase in BMI in the male endurance runners. In the current study no significant age-related increase was found in the BMI of masters cyclists, possibly due to no significant effect of age on masters cyclists training distance or training frequency.

In summary, the current study investigated the effect of gender and age on BMI and found that gender does have effect on BMI, whereas age does not appear to have any significant effect on BMI in masters cyclists.

5.5 SUMMARY

This current study on masters cyclists found no effect of age or gender on training distance or frequency. In contrast to the findings of previous research on masters runners and triathletes, the present data suggest that masters cyclists are able to maintain their training practices into older age.

While the present study observed a significant difference in BMI with females reporting a lower BMI than males, there was no age effect observed in either gender cohort. This finding suggests that masters cyclists are able to maintain their weekly training distance and training frequency into older age furthermore this allows them to maintain a lower BMI than an age-and gender-matched normal population.

The next chapter will present the conclusion of the current study and suggest possible future research directions in the light of current findings.

CHAPTER 6: CONCLUSION AND FUTURE RESEARCH DIRECTIONS

6.1 CONCLUSION

The current study examined the effects of both age and gender on training practices (frequency and distance) and BMI among male and female masters cyclists over the age of 35 years. The study found activity levels to be higher and BMI lower in masters cyclists compared to the general Australian population.

The major findings of the present study were that there was no effect of gender or age on training distance and training frequency in masters cyclists. However, while there was also no effect of age on BMI in masters cyclists, there was a significantly lower BMI in female masters cyclists compared to male masters cyclists suggesting an effect of gender on BMI in masters cyclists.

The present findings suggest masters cyclists are able to maintain weekly training distance and frequency. These findings are in contrast with findings in other endurance sports such running and triathlons where an age-related decline in training volume is commonly observed. Furthermore, the ability to maintain high levels of cycling distance and frequency as masters cyclists age may explain why the BMI of these athletes does not increase as is observed the general population. This may allow masters cyclists to age more successfully with a decreased risk of obesity associated diseases.

6.2 FUTURE RESEARCH DIRECTIONS

The following research questions are suggested as outcomes from the present study:

1. What is the effect of age and gender on intensity of training in male and female masters cyclists?
2. What mode(s) of cycling training (track, road, hill, and interval) do male and female masters cyclists train both on and off the bicycle?
3. What form(s) of resistance training do masters cyclists undertake?
4. Is there an effect of age on perceived benefits and constraints to participation in masters cycling?

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APPENDICES

Appendix A

Focus group ethics application and approval letter.

HUMAN RESEARCH ETHICS COMMITTEE

Negligible and Low Risk Review Process and Application Form

Please write in BLOCK letters using a black pen or TYPE.

Signatures can be inserted electronically (soft copy) or sign a hard copy (paper).

The National Health and Medical Research Council (NHMRC) 'National Statement on Ethical Conduct in Human Research', 2007 (the National Statement') recognises that human research involves a wide range of activities that have variable risks and potential benefits. The National Statement establishes different levels of ethical review, based on the degree of risk involved.

There are three levels of risk:

- Harm;
- Discomfort; and
- Inconvenience.

Researchers and HRECs are required to determine the existence, likelihood and severity of these risks based on the research methodology and design, participant population and research activity. The National Statement, sections 2.1.6-2.1.7 holds that:

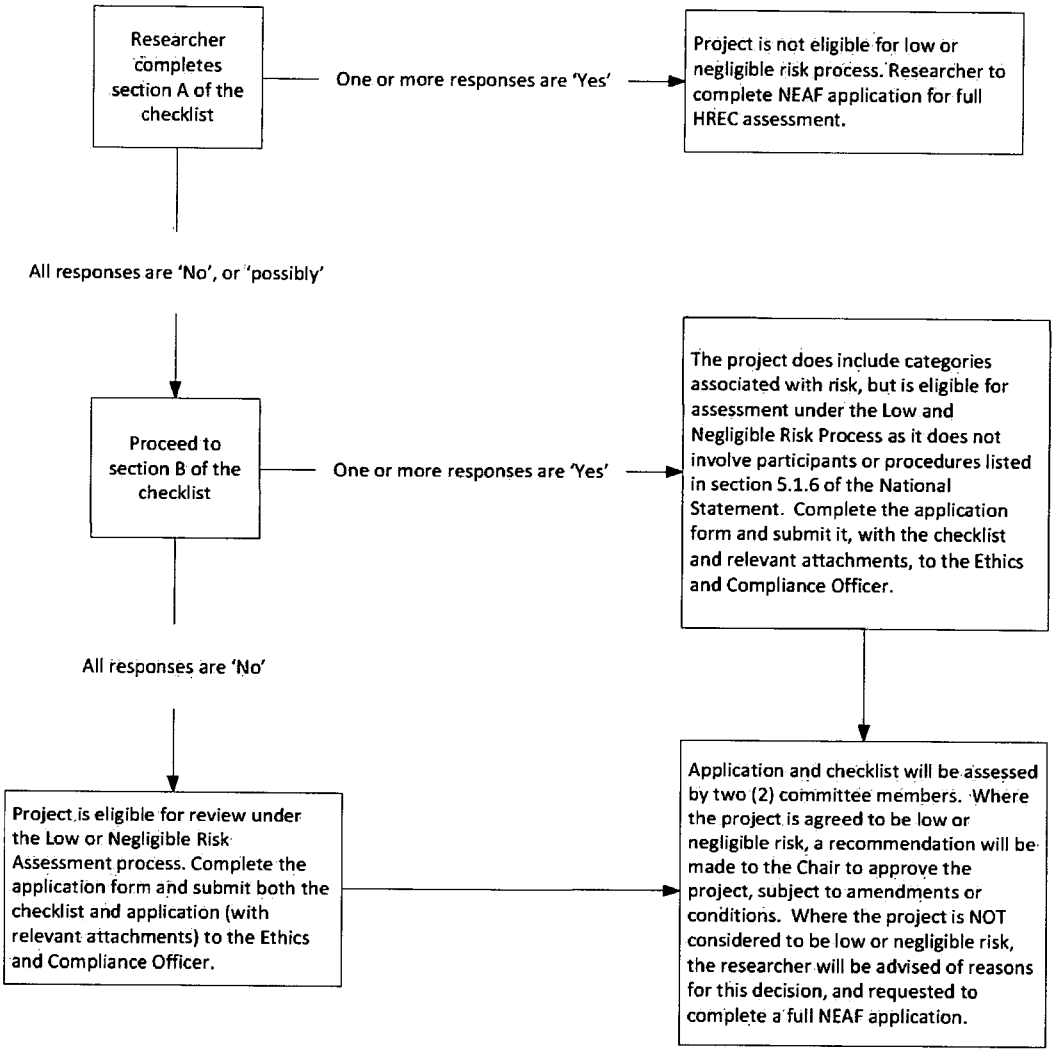
> *2.1.6 Research is 'Low Risk' where the only foreseeable risk is one of discomfort. Where the risk, even if unlikely, is more serious than discomfort, the research is not low risk.*
>
> *2.1.7 Research is 'negligible risk' where there is no foreseeable risk of harm or discomfort; and any foreseeable risk is not more than inconvenience. Where the risk, even if unlikely, is more than inconvenience, the research is not negligible risk'.*

Research that involves the risk of harm or the likelihood of harm must be reviewed by a fully constituted HREC. For research involving only the risk of inconvenience, or discomfort (i.e., low or negligible risk), Institutions may establish an alternative ethical review process. CQUniversity has resolved to proceed with such an alternative process.

It should be noted that research involving certain groups, methodologies or procedures, regardless of the level of risk, must be reviewed by a full HREC (Clause 5.1.6 of the National Statement).

There are a range of resources available to researchers on the Human Research Ethics Committee webpage (http://www.cqu.edu.au/research/current-research-staff/committees-and-ethics/human-research-ethics-committee), including sample information sheets, consent forms and an example of a completed Low Risk Application form. Researchers are encouraged to complete the checklist first and consult with the Ethics and Compliance Officer to gain an assessment of whether the project satisfies the criteria for alternative review. Time constraint is NOT an acceptable reason for seeking review through this process.

Process Flowchart



LOW OR NEGLIGIBLE RISK ASSESSMENT PROCESS CHECKLIST

SECTION A

Please indicate whether your project involves any of the following:

YES ☐	NO ☒	Participants are identifiable or re-identifiable
YES ☐	NO ☒	Some form of deception is involved
YES ☐	NO ☒	The procedure involves experimental manipulation or includes the presentation of any stimulus other than question-asking
YES ☐	NO ☒	The project involves interventions and/or therapies, including clinical and non-clinical trials and innovations, human genetics or human stem cells

Please indicate whether your project is actively seeking to recruit participants meeting the criteria below. Note – If it is possible that participants may meet one or more of these criteria as a result of being part of the general population, you should tick the 'possibly' box.

YES ☐	Possibly ☐	NO ☒	Participants are aged less than 18 years
YES ☐	Possibly ☐	NO ☒	Participants are cognitively or emotionally impaired, or are highly dependent on medical care
YES ☐	Possibly ☒	NO ☐	Participants belong to the Aboriginal or Torres Strait Islander People
YES ☐	Possibly ☒	NO ☐	Female participants who are pregnant and/or the human foetus
YES ☐	Possibly ☐	NO ☒	Participants who may be involved in illegal activities, where the research is intended to study or expose illegal activity

IF you have answered YES to any of the above, your project CANNOT be considered under the Low or Negligible Risk Assessment Process, and you must lodge a NEAF application to the Human Research Ethics Committee.

If you have answered either 'NO' or 'Possibly' to all of the above, please proceed to Section B.

SECTION B

Are any of the following topics covered in part or in whole?

YES ☐	NO ☒	Research about parenting issues
YES ☐	NO ☒	Research investigating sensitive personal or cultural issues
YES ☐	NO ☒	Explorations of grief, death or serious/traumatic loss
YES ☐	NO ☒	Mental disorders, e.g., depression, mood states, anxiety
YES ☐	NO ☒	Gambling
YES ☐	NO ☒	Eating disorders
YES ☐	NO ☒	Illicit drug use/Substance abuse (prescription or over the counter)
YES ☐	NO ☒	Self report of criminal behaviour
YES ☐	NO ☒	Any psychological disorder
YES ☐	NO ☒	Suicide risks/Anger management
YES ☐	NO ☒	Gender identity/Sexuality
YES ☐	NO ☒	Race or ethnic identity
YES ☐	NO ☒	Any disease or health problem
YES ☐	NO ☒	Fertility/Termination of pregnancy

Are any of the following procedures to be employed?

YES ☐	NO ☒	Use of personal data obtained from Commonwealth or State Government Department/Agency with participant consent
YES ☐	NO ☒	Deception of participants or concealing the purposes of the research
YES ☐	NO ☒	Covert observation (or minimal disclosure)
YES ☐	NO ☒	Audio or visual recording without consent
YES ☐	NO ☒	Recruitment of a third party or agency (asking participants to provide information about another person)
YES ☐	NO ☒	Withholding from one group specific treatments or methods of learning from which they may 'benefit' (e.g., in medicine or teaching).
YES ☐	NO ☒	Psychological interventions or treatments
YES ☐	NO ☒	Application of physical stimulus/Invasive physical procedures/Infliction of pain
YES ☐	NO ☒	Administration of drugs/Administration of other substances or devices
YES ☐	NO ☒	Exposure to ionising radiation
YES ☐	NO ☒	Tissue sampling or blood for pathological or genetic testing
YES ☐	NO ☒	Collecting body fluid (e.g., saliva)
YES ☐	NO ☒	Use of medical records where participants can be identified or linked

Other Risks:

YES ☐	NO ☒	Are there risks to the researcher? (e.g., research conducted in unsafe environments or trouble spots)
YES ☐	NO ☒	Are there risks to non participants in the research, such as participant's family members and social community? (e.g., effects of biography on family and friends or infectious disease risk to the community)

Select the categories of people that are targeted or likely to be targeted as participants in this research project

YES ☐	NO ☒	Suffers from a psychiatric or psychological disorder
YES ☐	NO ☒	Suffering a physical disability or medical condition
YES ☐	NO ☒	Children and/or young people without parental or guardian consent
YES ☐	NO ☒	Resident of a custodial institution
YES ☐	NO ☒	Unable to give freely an informed consent because of difficulties in understanding information provided (e.g., language difficulties, NESB)
YES ☐	NO ☒	Members of a socially identifiable group with special cultural or religious beliefs or political vulnerabilities
YES ☐	NO ☒	Participants are identifiable in final report when specific consent for release has not been given
YES ☐	NO ☒	Those in a dependent relationship with the researchers (e.g., lecturer/student, doctor/patient, teacher/pupil and professional/client)

If 'NO' has been selected for all questions in sections A and B, the project IS eligible for review under the Low or Negligible Risk Assessment process. Please complete the Application Form which follows and submit this entire document, together with a copy of the Information Sheet, Consent form and research instrument to the Ethics and Compliance Officer.

If you have selected 'YES" to any of the items in Section B, the project MAY STILL BE ELIGIBLE for assessment under the Low or Negligible Risk Assessment Process. Please complete the Application Form which follows and submit this entire document, together with a copy of the Information Sheet, Consent form and research instrument to the Ethics and Compliance Officer.

LOW OR NEGLIGIBLE RISK ASSESSMENT PROCESS APPLICATION FORM

This form is to be completed for research involving no more than low or negligible risk, as identified by completion of the checklist on the preceding pages.

If you are a staff member seeking to survey students enrolled in courses that you have responsibility for, please ensure that in section 2.7 of the form you acknowledge that there is a power differential between the researcher and participant, and address how you will minimise the potential for students to feel obligated to participate.

Please ensure that:

- You have attached the completed checklist.
- All signatures have been obtained.
- You have included copies of Information Sheets, Consent Forms, Research Instruments (survey, interview questions, etc.) and approvals from participating organisations (as appropriate).
- You do not commence data collection until written approval has been received from the Chair of the Human Research Ethics Committee.

Return to:

Ethics and Compliance Officer
Research Services - CQIRP
Office of Research (Bldg 361, Rm G.01)
CQUniversity Australia
Ibis Avenue
Rockhampton Queensland 4701

Phone: 07 4923 2603
Fax: 07 4923 2600
Email: ethics@cqu.edu.au

PART 1 RESEARCHERS

Principal Researcher:

Title	Associate Professor
Name	Peter Reaburn
Telephone	4923 2621
Facsimile	4930 9209
Email	p.reaburn@cqu.edu.au
Current Qualifications	PhD Grad Cert Flex Learn BHMS(Ed)(Hons)
Research experience	20 years research experience and 13 years postgraduate supervision experience. Research active staff member.
If CI is a student, specify program	Supervisor

Other Researchers (If you are a student, please include your supervisor details):

Title	Mr	Title	Dr
Name	Campbell Macgregor	Name	Marko Korhonen
Telephone	4923 2539	Telephone	050-5874569
Facsimile	4930 9209	Facsimile	
Email	c.macgregor@cqu.edu.au	Email	marko.t.korhonen@jyu.fi
Qualifications	BPhEd, Dip Project Management, Certificate in Exercise Science, ESSAM AEP.	Qualifications	PhD
Research experience	None	Research experience	9 years of research experience, research active staff member with 7 recently published articles.
Role (supervisor, co-researcher)	Student - Masters in Sport and Exercise Sciences	Role (supervisor, co-researcher)	associate-supervisor

Title		Title	
Name		Name	
Telephone		Telephone	
Facsimile		Facsimile	
Email		Email	
Qualifications		Qualifications	
Research experience		Research experience	
Role (supervisor, co-researcher)		Role (supervisor, co-researcher)	

Authorisation from external organisations (if research is not conducted at CQUniversity locations)

Title	Mr
Name	Geoff Rynne (NEED e-mail from Geoff to support research)
Telephone	07 3390 1477
Facsimile	07 3390 2852
Email	geoff.rynne@cycling.org.au
Position in organisation	Chief Executive Officer - Cycling Queensland0

PART 2 PROJECT DETAILS

2.1 Project Title:

Pilot study – An examination of current training practices in Masters road and track cycling participants using focus group methodology

2.2 Layperson Description:

Briefly outline in simple terms the project's aim(s), justification, participant group(s), method and possible outcomes

Cycling is one of the fastest growing competitive sports and recreational activities throughout the world. Competitive cycling consists of two disciplines - road racing undertaken on the open road and track cycling undertaken on a velodrome. While the training practices of younger competitive road and track cyclists has been well researched, no research to date has been undertaken on aged athletes including masters cyclists. The purpose of this study is gain information into the current training practices of male and female masters road and track cyclists, definded as competitors over the age of 35 years

Using focus group methodology, a group discussion with 8-10 Rockhampton-based masters road and track cyclists will be conducted to explore their current training practices. The findings will provide a springboard to develop an online survey conducted through both the Cycling Queensland database (see letter of support attached) and Pan Pacific Masters Games, both of which will examine training practices in masters cyclists using the outomes of the focus group project. A subsequent ethics application will be presented for the online survey. The current application is part of a Masters HMSc project. Both the focus group and online survey projects will form the platform for further research as part of a subsequent PhD project.

The current study aims to inform the development of an online questionnaire adapted from two previously published questionnaires into one suitable for masters cyclists. The first questionnaire was developed by Dr. Will Hopkins and used in a study (Liow & Hopkins,1996). that examined the training and performance of triathletes, with the second questionnaire used by Associate Professor Mike Climstein from Bond University (Australia) which was delivered to World Masters Games athletes in Sydney, Australia 2009 (Climstein et al., 2011). The proposed questions to be asked in the focus group are attached.

For the present study, Associate Professor Peter Reaburn will contact 8 to 10 Central Queensland male and female masters cyclists via an email to the Rockhampton Cycling Club membership asking for their participation in the focus group (email example attached). Included with this email will be an information sheet (attached) and Informed Consent document (attached). Focus groups will be held and follow semi-structured processes where focus group questions (Attached as Appendix B) will be initially broad, then moving on to targeting the questions to specific areas of interest (Krathwohl, 1998). Data will be analysed using statistical analyses (quantitative data) and nVivo (qualitative data).

The e-mail will invite them to participate in one focus group lasting approximately one-hour on the CQUniversity Rockhampton Campus. Focus group participation is voluntary and opt-in. Both the Information Sheet (which the participants will keep) and Informed Consent documents will highlight that participants will be free to withdraw from the project at any time and for any reason without penalty.

2.3 Data collection dates:

Start	1st June 2012	End	31st July 2012

2.4 Data Collection methods: (Please tick methods as appropriate)

☐ Interviews ☒ Focus Groups

☐ Hard Copy Survey ☐ Online Survey

Other (please specify)

2.5 Research Methodology:

Outline the proposed method, including data collection techniques, tasks participants will be asked to complete, estimated time commitment required of them, and how data will be analysed. Give a justification of your proposed sample size, including details of statistical power of the sample where appropriate

From an existing database of Rockhampton Cycling Club members, an email (attached) will be sent to 8 – 10 local male and female masters cyclists asking them to participate in a single focus group. Each participant would receive in this email an invitation, an opt-in option, their information sheet and their informed consent.

Each participant, who positively responds, will then be sent an email seven days before the planned focus group as a reminder and then again on the day of the focus group meeting. Refreshments in the form of sandwiches, coffee, tea and juice will be provided to the participants.

Upon arrival at the venue, the signed informed consent form will be collected from the participants.

Participants will then be seated around a meeting table in a meeting room at CQUniversity. Both open and closed ended questions will be asked as per the attached question sheet to initiate and facilitate discussion between the focus group participants.

This will be recorded upon consent of the participants and again they will be reminded of the opt-in nature of this research and that they can choose to leave at any stage with no penalty.

2.6 Research Aims and Significance:

State the aims, research objectives, key research questions, and significance of the project. Where relevant, state the specific hypothesis to be tested. Also, please provide a brief description of the relevance of your proposed project to current research, a justification as to why your research should proceed and an explanation of any expected benefits to the community or its potential to contribute to existing knowledge.

The aim of this pilot research is to assist in the development of an online questionnaire being developed to examine current training practices of masters cyclists. To date, no such information exists.

To date there is limited knowledge about the training practices of masters cyclists. Thus, this would be the first research of its type to be published. It will supply valuable information to both the cycling peak industry bodies and wider cycling community. Moreover, it will also form a baseline for future PhD research into masters cyclists. It will allow for the subsequent development of an online questionnaire to be specific to this population therefore allowing this group to understand the questions, and thus decreasing the time taken to research into the current training practices of masters cyclists. By making the on-line questionnaire simple and easily understood it is hoped that it will increase participation rate and limit the time taken for future participants in any future studies.

2.7 Risk:

Please outline the likelihood and severity of the risks to participants/others.

Involvement in this pilot study is opt-in and voluntary. The likelihood of harm and consequences of any involvement in the focus group is minimal and non-existent. After the audio recording has been transcribed, the focus group participants will become anonymous with a pseudonym being used for each participant.

Participants will be asked to give consent for the focus group to be audio recorded. They will at this time be again offered the chance to opt-in or out. They will be informed in writing that they are free to leave or withdraw their participation at any stage of the project without any penalty.

Please identify who (participants and/or others) the risk may affect.

Focus group participants. Each respondent will be given a pseudonym for the purpose of the written transcript arising from the audio recording.

Please outline the mechanisms taken to minimise the risk.

To minimize risk, participants will be reassured that the research team will not identify them once the transcript has been taken. It is an opt-in focus group and is voluntary. The focus group will be facilitated by an experienced researcher who has conducted focus group research previously, has facilitated meetings over many years, and provided lectures to students for over 20 years.

Data (recordings and transcriptions) will be stored on a computer that is password-protected and data stored on other electronic devices will be stored in a secure, locked cabinet in Associate Professor Peter Reaburn's locked office. Similarly, hard copies of any data (such as transcripts), once analyzed, will be stored in the same locked cupboard and office, being stored for the required period of time (5 years post last publication).

Refreshments will be offered to all participants to help make the meeting more confortable and making the time factor risk minimal. The meeting will also be held in a meeting room at the Student Residence, Capricornia College of CQUniversity Rockhampton, to allow for a safe and conveniant environment.

The transcription key will be located seperately in a locked filing cabinet in Associate Professor Peter Reaburn's locked office.

Please indicate the potential benefits of the research.

It is hoped that this focus group will allow the development of an online questionnaire to examine training practices in masters cyclists.

It will also allow the participants in the focus group to gain more insight into their own training practices and learn from other cyclists within the focus group.

Inform Cycling Australia and Cycling Queensland of training practices - facilitate education of members and coaches.

To whom the benefits are likely to accrue:

Cycling Queensland and Cycling Australia - members adminstrators and coaches.

Masters cyclists involved in the study

Research team.

PART 3 FUNDING AND FINANCE

Researchers should include any source of funding (e.g., departmental, commercial, non-commercial, government) – National Statement on Ethical Conduct in Human Research 2007, Chapter 5.4.

3.1 Has this protocol received research funding or is this submission being made as part of an application for research funding?

☒ YES ☐ NO

3.2 What is the source of funding and has the funding been approved?

☐ YES ☒ NO

CQUniversity Research Higher Degree of Exercise and Sport Science $2000. Funding is dependent upon successful DPORS and ethics.

3.3 Will the researcher receive any remuneration and/or in kind funding to perform this research?

☐ YES ☒ NO

If yes, please provide details:

3.4 Will participants receive any payment or expenses for participation in the research?

☐ YES ☒ NO

If yes, please provide details:

Participants will receive light refreshments during the focus group.

PART 4 OTHER APPROVALS

The principal researcher is responsible for informing each HREC of all other Australian sites at which the research is being proposed or conducted, at the time of submission of the research project, of any previous decisions regarding the research made by another HREC, and informing each HREC of whether the protocol is presently before another HREC (National Statement, Chapter 5.3).

4.1 Is this protocol being submitted or has it been previously submitted to another ethics committee?

☐ YES ☒ NO

4.2 If yes, give details of other centres involved; the approval status of the study at each centre; and details of any required

amendments.

4.3 **Other external approvals/reviews?**

If your research has undergone peer review, review from a funding body or involves participants from other organisations, copies of letters of approval or reviews must be attached to this application (if pending at the time the application is submitted, forward to Ethics and Compliance Officer when available). In some cases, institutions/authorities may decline to provide approval letters until ethics approval has been granted. In such cases, you should submit your application to the HREC for provisional approval pending receipt of the documentation.

4.4 **Has the research undergone peer review, review from a funding body or does it involve participants from other organisations?**

☒ YES ☐ NO If yes, specify from whom and attach a copy.

Email from Cycling Queensland (see attached)
Supervisor Associate Professor Peter Reaburn
Associate Supervisor Dr Marko Korhonen

PART 5 RECRUITMENT OF PARTICIPANTS

5.1 **Provide number, age range and source of participants. This explanation should also include how potential participants will be identified and how initial contact will be made. For CQUniversity staff recruiting students as participants, please note that approval to access students is required from either the Executive Dean of the faculty, or from the Executive Director (Corporate Services), depending on whether you are involving students from one faculty, or from across all faculties.**

8 to 10 male and female Masters cyclists aged 35+

Potential participants will be identified through Rockhampton Cycling Club membership database through Peter Reaburn's contacts as a member. Participants must be members of Cycling Queensland.

They will be told that light refreshments will be provided.

5.2 **What is the proposed method of recruitment of participants?**

Participation will be voluntary. It is based on their active membership with Cycling Queensland. It will be identified that this Rockhampton focus group will be part of a Masters in Exercise and Sport Sciences. An email will be sent to members of the Rockhampton Cycling Club Inc. within the Rockhampton area. The email will state that this is a focus group discussion and that they are free to withdraw from the project at any time for any reason without penalty or prejudice.

PART 6 CONSENT

The potential participants must be provided with information at their level of comprehension about the purpose, methods, demands, risks, inconveniences, discomforts and possible outcomes of the research (including the likelihood and form of publication of research results).

Informing participants: Participants Information Sheet and Consent Form

6.1 **Will the research involve informed consent of participants?**

☒ YES ☐ NO

6.2 **If yes, how will informed consent be obtained/recorded? If no, please justify why consent will not be obtained.**

Informed consent will be obtained and recorded on the informed consent sheet (attached). The informed consent will also be clearly displayed throughout the focus discussion and at least once before the focus discussion this will again be verbally stated.

Information sheets (that the participants keep) will also state that they are free to withdraw from the project at any time for any reason without penalty or prejudice.

PART 7 INFORMATION PROTECTION (Confidentiality, Data Storage, Security and Disposal)

Confidentiality:

7.1 **Explain what methods will be used to guarantee confidentiality/anonymity of participant data.**

No personally identifying information will be recorded beyond voice during the focus group meeting as per the informed consent. Therefore, once transcribed the data will be anonymous. The original audio and transciptions will be kept under lock and key in a locked office. In transcripts no original names will be used and no other identifying factors will be used in the pseudonyms. These will be allocated in random upon arrival. At no time will the real names of participants appear in any published documents.

Data Storage and security:

7.2 Explain how and where data will be held, including any arrangements for data security during the project?

Data stored on computer will be password protected and data stored on other electronic devices will be stored in a secure, locked cabinet in Associate Professor Peter Reaburn's locked office. Once analyzed, will be placed in a locked cupboard in the same locked office for the required period of time (5 years post last publication) in accordance with the CQUniversity Code of Conduct for Research.

7.3 Please outline how long the data will be kept?

Data will be kept for the 5 years past last publication in accordance with the CQUniversity Code of Conduct for Research.

7.4 Will the data be disposed of at some point?

☒ YES ☐ NO

7.5 If yes, how will the data be disposed of? If no, why is the data to be retained, and how/where will it be stored.

Yes

Files will be deleted from the server. Hard copies will be placed in the document destruction bins on campus to be shredded after the 5 years post last publication as required by CQUniversity.

PART 8 DISSEMINATION OF RESULTS

8.1 Explain when, how, where and to whom results will be disseminated, including whether participants will be provided with information on the findings or outcomes of the project.

The results will form part of a Masters research thesis, providing a tool to gain valuable information into the current training practices of masters cyclists. This subsequent online questionnaire will then be used to survey masters cyclists throughout Queensland. From this thesis, there will be an ongoing series of studies that will combine to form a number of publications, conference papers and workshops. After this initial pilot study focus group, a brief plain English statement about the results will be supplied back to the focus group participants and Cycling Queensland therefore informing that participants and other members of the cycling community about the results.

PART 9 DECLARATIONS

Signatures and undertakings:

Applicant/Principal Researchers (including students and supervisors where appropriate)

I/We certify that:

- All information is correct and complete as possible;
- I/We have had access to and read the NHMRC 'National Statement on Ethical Conduct in Human Research', (2007);
- The research will be conducted in accordance with the National Statement;
- I/We have consulted any relevant legislation and regulations, and the research will be conducted in accordance with these;
- I/We will immediately report to the HREC anything that might warrant review of the ethical approval of the research including:
  - Serious or unexpected adverse effects on participants
  - Proposed changes in the protocol; and
  - Unforseen events that might affect continued ethical acceptability of the project;
- I/We have attempted to identify all the risks related to the research that may arise in conducting this research and acknowledge my/our obligations and the rights of participants;
- I/We will not continue the research if ethical approval or site authorisation is withdrawn and will comply with any special conditions required by the HREC, including:
  - Conditions of approval stipulated by the HREC, and
  - Cooperate with monitoring requirements. At a minimum annual progress reports and a final report will be provided to the HREC
- I/We have the appropriate qualifications, experience and facilities to conduct the research set out in the attached application and to deal with any emergencies and contingencies related to the research that may arise;

Peter Reaburn	Signature Redacted	2/5/12
Print Name		Date
Campbell Macgregor	Signature Redacted	1/5/2012
Print Name		Date
Marico Kohlhoven	Email Attached	27/4/2012
Print Name	Signature	Date
Print Name	Signature	Date

Campbell Macgregor

From: Korhonen Marko [marko.korhonen@sport.jyu.fi]
Sent: Friday, 27 April 2012 5:25 PM
To: Campbell Macgregor; Peter Reaburn
Subject: RE: Meeting agenda items

I have read this ethics application and agree to support this.

Marko Korhonen

Looks good- just some ideas→. About training questionnaires, since many physiological characteristics, especially bone density may determined in childhood and young adulthood there may be need for extra questions such as :

- How many years have you trained systematically ?
- Any breaks in training (years)
- Type of training in childhood and young adulthood?

And for training and competition you may also consider adding:

- How many competitions did you have in last season ? (perhaps after question 2)
- What was your 2-3 best ever cycling competition achievement (year, event , position, and result if on track) and best results in veteran age-groups and in the previous seasons'
- To help to answer question 12: Time or number of training sessions spended in different zones (e.g. from Jeukendrup) : zone 1 (Z1) = <70%HR_{max}, zone 2 (Z2) = 70%-80%HR_{max}, zone 3 (Z3) = 80%-90%HR_{max}, zone 4 (Z4) = 90%-95%HR_{max}, and zone 5 (Z5) = >95%HR_{max}.
- Do you have a training diary ?

Finally you could include few open questions (considering bone)

Do you take or have you taken calcium no ( ) yes ( ) _____mg/d , D -vitamin no ( ), yes ( ) _____ug/d or any other nutrition supplements ? What , when_____
Have you ever smoked ? no ( ), yes ( ) years: _____
Have you or have you had any serious injuries or diseases affecting your training ?_____

Best wishes,

Marko

From: Campbell Macgregor [mailto:c.macgregor@cqu.edu.au]
Sent: 27. huhtikuuta 2012 8:01
To: Peter Reaburn; Korhonen Marko
Subject: Meeting agenda items

Hi Peter and Marko,

Agenda items for next meeting Monday the 30th

Schedule of progress and suggested timelines – attached working document.

Flow chart of research – draft attached

1

Dear Members

Invitation

Current training practices of masters' cyclists

A focus group of masters' cyclists – what are your current training practices?

Facilitated by: Associate Professor Peter Reaburn

DATE: 28th May 2012

TIME: 7:00pm-8:00pm

VENUES: Rockhampton –Student Residence – Board room.

An opportunity has been presented to our Masters members to participate in a small focus group, to be held at the Student Residential College, Rockhampton on the CQUniversity grounds (North End), in the office boardroom on Monday the 28th May 2012.

This offer is for cyclists aged 35 and over. It is to inform the researchers (Associate Professor Peter Reaburn and Mr. Campbell Macgregor) about current training habits of Masters Cyclists.

The focus group, will simply be a group discussion answering a series of questions about your current training habits, it is anticipated to last about an hour and refreshments will be provided.

Please read the information sheet attached and respond directly to Associate Professor Peter Reaburn at p.reaburn@cqu.edu.au if you are able to attend.

Attached are an information sheet and an informed consent form. Please read both forms and bring the completed, informed

consent form to the focus group meeting. Upon acceptance we will send you a map of the building and location within the university grounds of the meeting room.

Both Peter and Campbell look forward to your response and seeing you there.

Regards

(Associate Professor Peter Reaburn's official university signature)

INFORMATION SHEET

Pilot study – Training practices in Masters track and road cyclists.

Project Overview
While cycling is one of the fastest growing sports and recreational activities throughout the world, no research to date has examined the training practices of masters cyclists. The purpose of this study is gain information into the current training practices of veteran cyclists. The findings will provide a springboard for further research within the cycling fraternity, especially with the masters cyclist.

This pilot study will be used to inform the development of an on-line questionnaire from the combining of two previously published questionnaires into one suitable for masters cyclists.

Participation Procedure
You will be asked to attend a 60-minute focus group discussion with 7-9 other masters' cyclists at the CQUniversity Rockhampton campus. You will simply answer and then dicuss upto 16 questions asked by Associate Professor Peter Reaburn about your current training practices as a masters cyclist. This session will be audio taped then transcribed by Mr. Campbell Macgregor. Light refreshements will be provided to the participants.

Benefits and Risks
It is hoped that this focus group will allow in the future, the combination of two surveys into a simple questionnaire that will enable a reliable collection of data on training practices of masters cyclist. Once recorded, the discussion will be transcribed using numbers or false names to protect your identity.

It will allow the participants in the focus group to gain more insight into their own and other masters cylist training practices.

We appreciate that each participant is giving up an hour of their own time, for this reason we will be providing light refreshments (sandwiches, juice, coffee/tea) during the discussion session. It is not anticipated that any negative consequences will arise but should any participant feel unconfortable they are free to leave at any time without penalty and can contact the Office of Research if you have any issues regarding the research (full contact details listed over).

Confidentiality / Anonymity
Under no situations will individually identifiable information be published. Data will be stored on computer that will be password protected. Data stored on other electronic devices or in hardcopy will be stored in a secure, locked cabinet in the researcher's office. Once analyzed, will be placed in a locked cupboard in the same locked office for the required period of time (5 years post last publication) in accordance with the CQUniversity Code of Conduct for Research. The transcription key will be stored seperately (locked in Associate Professor Peter Reaburns office)

Outcome / Publication of Results
The results will form part of a Masters Research Thesis, providing a tool to gain valuable information into the current training practices of masters cyclists. This tool will subsequently be used to survey masters cyclists throughout Queensland and Australia. From this Thesis there will be an ongoing series of research studies that will combine to form a number of publications, conference papers and workshops

Consent
Informed consent will be obtained and recorded on the informed consent sheet.

Right to Withdraw
At any stage or time participants have to right to withdraw for any reason and at any time without penalty.

Feedback
After this initial focus group, a brief English statement about the results will be supplied back to yourselves, Cycling Queensland and placed in their next newsletter, therefore informing participants and other members of the cycling community about the results.

Questions/ Further Information
Please contact
Mr Campbell Macgregor
Ph 07 49232539
c.macgregor@cqu.edu.au

Concerns / Complaints
Please contact CQUniversity's Office of Research (Tel: 07 4923 2607; E-mail: research-enquiries@cqu.edu.au; Mailing address: Building 32, CQUniversity, Rockhampton QLD 4702) should there be any concerns about the nature and/or conduct of this research project.

Focus group for current training habits of Masters cyclists in Australia.

Informed Consent Form

Name:

Address:

Phone Number:

Organisational Affiliation:

I: _____ agree to take part in the research project 'A focus group about the current Training habits of Masters cyclists in Queensland'.

I have read the written information sheet regarding this research project. ☐

I understand that I may refuse to answer any questions and/or withdraw from the study at any time without penalty. ☐

I understand that I am under no obligation to take part in any future study as part of this project. ☐

I consent to participate in the future studies for purposes of this research project. ☐

I understand that portions or quotations from my answers may be used in publications arising from this research but that my name will not be associated with the statement. ☐

I give consent for my voice to be recorded using an electronic recorder for the purpose of this focus group. ☐

I understand that a summary of the findings of the study will be sent to me. ☐

I understand what this study involves and agree to participate. ☐

I have been given a copy of this consent form. ☐

Date:

Signature of Participant

Signature of Researcher:

Should you have any concern about the conduct of this research project, please contact the CQUniversity Ethics and Compliance Officer, Office of Research, CQUniversity, Bruce Highway, Rockhampton, QLD 4702 Telephone +61 7 4623 2603, email ethics@cqu.edu.au

Focus group questionnaire run sheet.

Before the participants arrive

Email stating "Please read through you information sheet and keep this as a reference (attachment 1") Can you please fill out your informed consent and sign them, and bring them when attending your focus group. (*make sure spare copies are available on the night in case they forget them*) pass them to me to allow me to sign them too. (Attachment 2).

5mins Introduction

Today we are going to be asking you questions about your current cycling training.
This is so we can develop a specific internet-based questionnaire that is relevant and reflects masters cyclists training practices.
Today's focus group will be based on a series of general questions and then move into specific questions towards the end of the discussion.
It should take about an hour.
You have the right to leave the focus group at anytime without penalty and for any reason.
(Toilets and emergency exit discussion here depending on event location)

1. What levels would there be in masters cycling? EG Local, regional, national, international? Or is it better to break it down in some other way?
2. Do you do road, track or both types of racing?
3. Do you train specifically for each type of racing?
4. Do you break your season down into phases and if so how?
5. How many kms do you do in a typical week during each phase?
6. How often do you train and for how long in time for each of these phases??
7. How do you change your training during different parts of the season?
8. What other forms of training do you use regularly? (strength, flexibility)
9. How many times a week do you do these other types of training?
10. How long is each of these sessions?
11. How do you describe intensity on the bike? (HR, power output, speed or others)
12. How do you describe intensity for things such as weight training?
13. Do you like your training sessions to be individual or in a group?
14. Do you warm up? If so how?

15. Do you use recovery practices after training and if so what specifically do you do?

16. What is the difference in the training undertaken by track cyclists compared to road cyclists?

5 Mins Closing.

Thank you for your time tonight participating in this focus group. This information will be used to develop a questionnaire to find out what Masters Athletes are currently doing for their training. Does anyone have any general comments they would like to make? Again thank you.

Cycling QUEENSLAND

Chandler Velodrome
Sleeman Sports Complex
Cnr Old Cleveland and Tilley Rds
Chandler QLD 4155
PO Box 4115 Gumdale QLD 4154
T: 07 3390 1477
F: 07 3390 2852
E: qld.info@cycling.org.au

Mr Campbell Macgregor
Exercise and Sports Science
CQ University Australia
Rockhampton Campus
Building 81 Room 1.16
Bruce Highway
Rockhampton QLD 4701

20 April 2012

Cam

I write to confirm Cycling Queensland's support for the study being undertaken by Associate Professor Peter Reaburn and yourself in relation to Masters Cyclists in Queensland. It is commendable that the study is focussing on Masters as it is usual for the focus to be on younger groups and at the high performance program level.

The Association would be please to assist the study and the Business Services Officer, Mr Lachlan Paull, will be the contact at Cycling Queensland to provide any assistance required.

Yours Sincerely

Signature Redacted

Geoff Rynne
CEO
Cycling Queensland

CAPRICORNIA COLLEGE

Friday, April 27, 2012
Campbell Macgregor
Tutor/Masters Students

Campbell,

As we discussed, here is a quotation for your function being held on the date and time TBC at Building 51 Conference Room Capricorn College Rockhampton Campus for 10 to 12 pax.

I am happy to provide the room and light refreshments in the way of tea and coffee for your group; I also can provide a combination platter of hot nibbles and cold crudets for a small fee of $46.50 delivered to you meeting on the time convenient to you and your group's schedule.

Sincerely,

Rodney Paton
Ext 9587
catering@cqu.edu.au

Secretary, Human Research Ethics Committee
Ph: 07 4923 2603
Fax: 07 4923 2600
Email: ethics@cqu.edu.au

CQUniversity
Bruce Highway
Rockhampton QLD 4702
AUSTRALIA
Tel +61 7 4930 9777
www.cquni.edu.au

A/Prof Peter Reaburn
School of Medical and Applied Sciences
Building 6

14 May 2012

Dear A/Prof Reaburn

HUMAN RESEARCH ETHICS COMMITTEE ETHICAL APPROVAL PROJECT: H12/05-076 *PILOT STUDY - AN EXAMINATION OF CURRENT TRAINING PRACTICES IN MASTERS ROAD AND TRACK CYCLING PARTICIPANTS USING A FOCUS GROUP METHODOLOGY*

The Human Research Ethics Committee is an approved institutional ethics committee constituted in accord with guidelines formulated by the National Health and Medical Research Council (NHMRC) and governed by policies and procedures consistent with principles as contained in publications such as the joint Universities Australia and NHMRC *Australian Code for the Responsible Conduct of Research.* This is available at http://www.nhmrc.gov.au/publications/synopses/_files/r39.pdf.

On 14 May 2012, the Chair of the Human Research Ethics Committee considered your application under the Low Risk Review Process. This letter confirms that your project has been granted approval under this process, pending ratification by the full committee at its May 2012 meeting.

The period of ethics approval will be from 14 May 2012 to 31 July 2012. The approval number is H12/05-076; please quote this number in all dealings with the Committee. HREC wishes you well with the undertaking of the project and looks forward to receiving the final report.

The standard conditions of approval for this research project are that:

(a) you conduct the research project strictly in accordance with the proposal submitted and granted ethics approval, including any amendments required to be made to the proposal by the Human Research Ethics Committee;

(b) you advise the Human Research Ethics Committee (email ethics@cqu.edu.au) immediately if any complaints are made, or expressions of concern are raised, or any other issue in relation to the project which may warrant review of ethics approval of the project. *(A written report detailing the adverse occurrence or unforeseen event must be submitted to the Committee Chair within one working day after the event.)*

(c) you make submission to the Human Research Ethics Committee for approval of any proposed variations or modifications to the approved project before making any such changes;

(d) you provide the Human Research Ethics Committee with a written "Annual Report" on each anniversary date of approval (for projects of greater than 12 months) and "Final Report" by no later than one (1) month after the approval expiry date; *(A copy of the reporting pro formas may be obtained from the Human Research Ethics Committee Secretary, Sue Evans please contact at the telephone or email given on the first page.)*

(e) you accept that the Human Research Ethics Committee reserves the right to conduct scheduled or random inspections to confirm that the project is being conducted in accordance to its approval. Inspections may include asking questions of the research team, inspecting all consent documents and records and being guided through any physical experiments associated with the project

(f) if the research project is discontinued, you advise the Committee in writing within five (5) working days of the discontinuation;

(g) A copy of the Statement of Findings is provided to the Human Research Ethics Committee when it is forwarded to participants.

Please note that failure to comply with the conditions of approval and the *National Statement on Ethical Conduct in Human Research* may result in withdrawal of approval for the project.

You are required to advise the Secretary in writing within five (5) working days if this project does not proceed for any reason. In the event that you require an extension of ethics approval for this project, please make written application in advance of the end-date of this approval. The research cannot continue beyond the end date of approval unless the Committee has granted an extension of ethics approval. Extensions of approval cannot be granted retrospectively. Should you need an extension but not apply for this before the end-date of the approval then a full new application for approval must be submitted to the Secretary for the Committee to consider.

The Human Research Ethics Committee wishes to support researchers in achieving positive research outcomes. If you have issues where the Human Research Ethics Committee may be of assistance or have any queries in relation to this approval please do not hesitate to contact the Secretary, Sue Evans or myself.

Yours sincerely,

Signature Redacted

Professor Phillip Ebrall
Chair, Human Research Ethics Committee

Cc: Mr Campbell McGregor (Student investigator)
Project file

Approved

Appendix B

Focus group questions.

So just from your observation and experience to get things rolling, what do you see as the different levels of competition and how do you define or describe the different levels of competition in cycling?
Do others say anything differently there?

So just as recreational, how would you define that? How would you define those people?
So different motivations but still on a club level. *Name* is there anything you can tell us about different levels?

So into club stuff.

Anything else, guys, on that that you would like to add?

That is a good one. And that is one thing we are interested in as well. So you guys, typical club members, do you do road or track or both?

Thanks. Is there anything else that you want to add on that?

Does anyone want to contribute anything else to that discussion?

Yeah, that's a point we have not considered. That is a very strong contribution.
Given that you are doing a range of road and track and mountain bike and you are doing your long and ultra enduring stuff do you train specifically for track, road or do you just have a same training regime (?)(16:54) all the time and how do you differentiate your training. And if you differentiate it, do you differentiate it over...do you break the season up?

And do you break your season down?

Do you break your preparation for an event down into training phases and what jargon might you use to break up your season whether it would be track or road?

What do you call those 2-3 month?

What about others. How do you describe your preparation for an event?

So you have like a racing season and an off season. So what about others?

When you describe your training, your typical week, how do you describe your time?

Do you talk in ks per week? How do you describe in terms of the amount of training you have done in the week?

What? Hours, or ks or are there other ways you can describe how much you have done in the week apart from ks or hours?

How do you describe, when it comes to intensity, how do you describe intensity?

Is it just on terms of how you ? I sense it is in hours and ks?

To take that a little further. What do you think a typical ks per week or hours per week for events, for masters? Just talking cycling.

How do people describe, talk to their partners, their mates about how hard it was. What units do you talk about?

So is that on a one to ten scale? Or is it easy medium or hard?

How do they describe that? How would you describe that?

And what are those descriptors? What might be those qualifiers?

What about the others? How do you describe how hard you go?

How do you describe that to your wife or your mates?

Moving away from how we talked about how you describe how much you do. We talked about how hard you go. How do you describe how often you go? Is it just times per week?

And how do you describe what you do in terms of how often you train?

For a triathlete? What about just cycling?

You've got your cycling training, the average speed, the heart rates, how often you go. What other, when you get off the bike, what other types of training do you use when you are thinking of enhancing your cycling or that you do because you think they are enhancing your cycling? And what are those other types of training?

Do you still do some running after you...?

You mentioned some recovery stuff. Just wanted to ask you... what recovery practises do you guys use? Specifically, what do you do to recover?

And when you do eat and drink. Do you focus on what specifically you eat and drink?

And you see that as important for your recovery? By having that it helps you to recover?

What about the others. What recover strategies do you use when you come home from cycling?

Who keeps a log book for their training?

And would it be important how often you talk to the coach?

So maybe we should also ask questions about stress. When you go cycling does it increase your stress?

What about the actual importance of competing? Is that an issue?

We talked about whether we look at motivation. What motivates you is the thing that gets you out of bed, competing...

Appendix C

Online questionnaire ethics application and approval letter.

HUMAN RESEARCH ETHICS COMMITTEE

Negligible and Low Risk Review Process and Application Form

Please write in BLOCK letters using a black pen or TYPE.

Signatures can be inserted electronically (soft copy) or sign a hard copy (paper).

The National Health and Medical Research Council (NHMRC) 'National Statement on Ethical Conduct in Human Research', 2007 (the National Statement') recognises that human research involves a wide range of activities that have variable risks and potential benefits. The National Statement establishes different levels of ethical review, based on the degree of risk involved.

There are three levels of risk:

- Harm;
- Discomfort; and
- Inconvenience.

Researchers and HRECs are required to determine the existence, likelihood and severity of these risks based on the research methodology and design, participant population and research activity. The National Statement, sections 2.1.6-2.1.7 holds that:

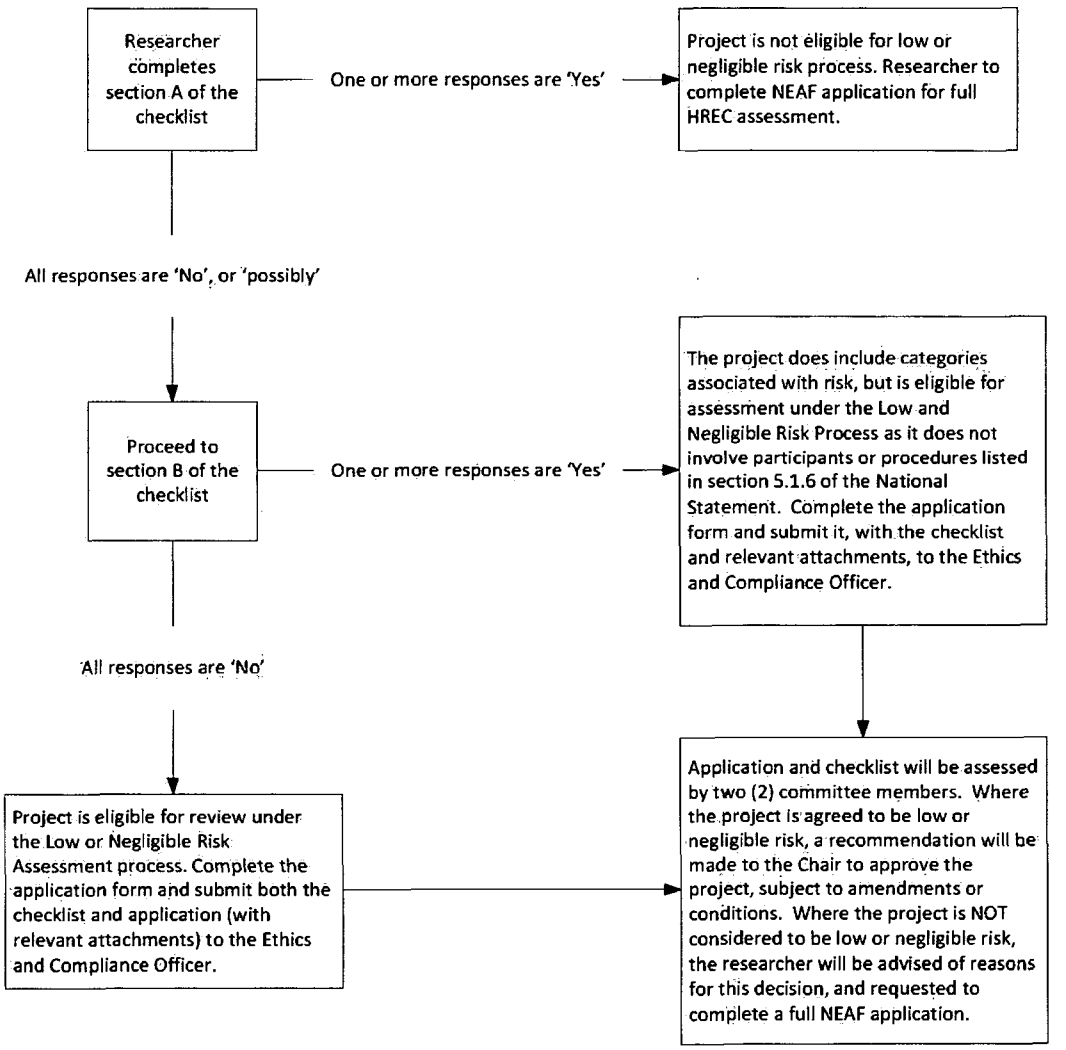
> *2.1.6 Research is 'Low Risk' where the only foreseeable risk is one of discomfort. Where the risk, even if unlikely, is more serious than discomfort, the research is not low risk.*
>
> *2.1.7 Research is 'negligible risk' where there is no foreseeable risk of harm or discomfort; and any foreseeable risk is not more than inconvenience. Where the risk, even if unlikely, is more than inconvenience, the research is not negligible risk'.*

Research that involves the risk of harm or the likelihood of harm must be reviewed by a fully constituted HREC. For research involving only the risk of inconvenience, or discomfort (i.e., low or negligible risk), Institutions may establish an alternative ethical review process. CQUniversity has resolved to proceed with such an alternative process.

It should be noted that research involving certain groups, methodologies or procedures, regardless of the level of risk, must be reviewed by a full HREC (Clause 5.1.6 of the National Statement).

There are a range of resources available to researchers on the Human Research Ethics Committee webpage (http://www.cqu.edu.au/research/current-research-staff/committees-and-ethics/human-research-ethics-committee), including sample information sheets, consent forms and an example of a completed Low Risk Application form. Researchers are encouraged to complete the checklist first and consult with the Ethics and Compliance Officer to gain an assessment of whether the project satisfies the criteria for alternative review. Time constraint is NOT an acceptable reason for seeking review through this process.

Process Flowchart



LOW OR NEGLIGIBLE RISK ASSESSMENT PROCESS CHECKLIST

SECTION A

Please indicate whether your project involves any of the following:

YES ☐	NO ☒	Participants are identifiable or re-identifiable
YES ☐	NO ☒	Some form of deception is involved
YES ☐	NO ☒	The procedure involves experimental manipulation or includes the presentation of any stimulus other than question-asking
YES ☐	NO ☒	The project involves interventions and/or therapies, including clinical and non-clinical trials and innovations, human genetics or human stem cells

Please indicate whether your project is actively seeking to recruit participants meeting the criteria below. Note – If it is possible that participants may meet one or more of these criteria as a result of being part of the general population, you should tick the 'possibly' box.

YES ☐	Possibly ☐	NO ☒	Participants are aged less than 18 years
YES ☐	Possibly ☐	NO ☒	Participants are cognitively or emotionally impaired, or are highly dependent on medical care
YES ☐	Possibly ☒	NO ☐	Participants belong to the Aboriginal or Torres Strait Islander People
YES ☐	Possibly ☒	NO ☐	Female participants who are pregnant and/or the human foetus
YES ☐	Possibly ☐	NO ☒	Participants who may be involved in illegal activities, where the research is intended to study or expose illegal activity

IF you have answered YES to any of the above, your project CANNOT be considered under the Low or Negligible Risk Assessment Process, and you must lodge a NEAF application to the Human Research Ethics Committee.

If you have answered either 'NO' or 'Possibly' to all of the above, please proceed to Section B.

SECTION B

Are any of the following topics covered in part or in whole?

YES ☐	NO ☒	Research about parenting issues
YES ☐	NO ☒	Research investigating sensitive personal or cultural issues
YES ☐	NO ☒	Explorations of grief, death or serious/traumatic loss
YES ☐	NO ☒	Mental disorders, e.g., depression, mood states, anxiety
YES ☐	NO ☒	Gambling
YES ☐	NO ☒	Eating disorders
YES ☐	NO ☒	Illicit drug use/Substance abuse (prescription or over the counter)
YES ☐	NO ☒	Self report of criminal behaviour
YES ☐	NO ☒	Any psychological disorder
YES ☐	NO ☒	Suicide risks/Anger management
YES ☐	NO ☒	Gender identity/Sexuality
YES ☐	NO ☒	Race or ethnic identity
YES ☐	NO ☒	Any disease or health problem
YES ☐	NO ☒	Fertility/Termination of pregnancy

Are any of the following procedures to be employed?

YES ☐	NO ☒	Use of personal data obtained from Commonwealth or State Government Department/Agency with participant consent
YES ☐	NO ☒	Deception of participants or concealing the purposes of the research
YES ☐	NO ☒	Covert observation (or minimal disclosure)
YES ☐	NO ☒	Audio or visual recording without consent
YES ☐	NO ☒	Recruitment of a third party or agency (asking participants to provide information about another person)
YES ☐	NO ☒	Withholding from one group specific treatments or methods of learning from which they may benefit (e.g., in medicine or teaching)
YES ☐	NO ☒	Psychological interventions or treatments
YES ☐	NO ☒	Application of physical stimulus/invasive physical procedures/infliction of pain
YES ☐	NO ☒	Administration of drugs/Administration of other substances or devices
YES ☐	NO ☒	Exposure to ionising radiation
YES ☐	NO ☒	Tissue sampling or blood for pathological or genetic testing
YES ☐	NO ☒	Collecting body fluid (e.g., saliva)
YES ☐	NO ☒	Use of medical records where participants can be identified or linked

Other Risks:

YES ☐	NO ☒	Are there risks to the researcher? (e.g., research conducted in unsafe environments or trouble spots)
YES ☐	NO ☒	Are there risks to non participants in the research, such as participant's family members and social community? (e.g., effects of biography on family and friends or infectious disease risk to the community)

Select the categories of people that are targeted or likely to be targeted as participants in this research project

YES ☐	NO ☒	Suffers from a psychiatric or psychological disorder
YES ☐	NO ☒	Suffering a physical disability or medical condition
YES ☐	NO ☒	Children and/or young people without parental or guardian consent
YES ☐	NO ☒	Resident of a custodial institution
YES ☐	NO ☒	Unable to give freely an informed consent because of difficulties in understanding information provided (e.g., language difficulties, NESB)
YES ☐	NO ☒	Members of a socially identifiable group with special cultural or religious beliefs or political vulnerabilities
YES ☐	NO ☒	Participants are identifiable in final report when specific consent for release has not been given
YES ☐	NO ☒	Those in a dependent relationship with the researchers (e.g., lecturer/student, doctor/patient, teacher/pupil and professional/client)

If 'NO' has been selected for all questions in sections A and B, the project IS eligible for review under the Low or Negligible Risk Assessment process. Please complete the Application Form which follows and submit this entire document, together with a copy of the Information Sheet, Consent form and research instrument to the Ethics and Compliance Officer.

If you have selected 'YES" to any of the items in Section B, the project MAY STILL BE ELIGIBLE for assessment under the Low or Negligible Risk Assessment Process. Please complete the Application Form which follows and submit this entire document, together with a copy of the Information Sheet, Consent form and research instrument to the Ethics and Compliance Officer.

LOW OR NEGLIGIBLE RISK ASSESSMENT PROCESS APPLICATION FORM

This form is to be completed for research involving no more than low or negligible risk, as identified by completion of the checklist on the preceding pages.

If you are a staff member seeking to survey students enrolled in courses that you have responsibility for, please ensure that in section 2.7 of the form you acknowledge that there is a power differential between the researcher and participant, and address how you will minimise the potential for students to feel obligated to participate.

Please ensure that:

- You have attached the completed checklist.
- All signatures have been obtained.
- You have included copies of Information Sheets, Consent Forms, Research Instruments (survey, interview questions, etc.) and approvals from participating organisations (as appropriate).
- You do not commence data collection until written approval has been received from the Chair of the Human Research Ethics Committee.

Return to:

Ethics and Compliance Officer
Research Services - CQIRP
Office of Research (Bldg 361, Rm G.01)
CQUniversity Australia
Ibis Avenue
Rockhampton Queensland 4701

Phone: 07 4923 2603
Fax: 07 4923 2600
Email: ethics@cqu.edu.au

PART 1 RESEARCHERS

Principal Researcher:

Title	Associate Professor
Name	Peter Reaburn
Telephone	4923 2621
Facsimile	4930 9209
Email	p.reaburn@cqu.edu.au
Current Qualifications	PhD Grad Cert Flex Learn BHMS(Ed)(Hons)
Research experience	20 years research experience and 13 years postgraduate supervision experience. Research active staff member.
If CI is a student, specify program	Supervisor of Campbell Macgregor - Masters in Sport and Exercise Sciences

Other Researchers (If you are a student, please include your supervisor details):

Title	Mr	Title	Dr
Name	Campbell Macgregor	Name	Marko Korhonen
Telephone	4923 2539	Telephone	050-5874569
Facsimile	4930 9209	Facsimile	
Email	c.macgregor@cqu.edu.au	Email	marko.t.korhonen@jyu.fi
Qualifications	BPhEd, Dip Project Management, Certificate in Exercise Science, ESSAM AEP.	Qualifications	PhD
Research experience	None	Research experience	9 years of research experience, research active staff member with 7 recently published articles.
Role (supervisor, co-researcher)	Student Yes - Masters in Sport and Exercise Sciences	Role (supervisor, co-researcher)	associate-supervisor

Title		Title	
Name		Name	
Telephone		Telephone	
Facsimile		Facsimile	
Email		Email	
Qualifications		Qualifications	
Research experience		Research experience	
Role (supervisor, co-researcher)		Role (supervisor, co-researcher)	

Authorisation from external organisations (if research is not conducted at CQUniversity locations)

Title	Mr
Name	Geoff Rynne
Telephone	07 3390 1477
Facsimile	07 3390 2852
Email	geoff.rynne@cycling.org.au
Position in organisation	Chief Executive Officer - Cycling Queensland

PART 2 PROJECT DETAILS

2.1 Project Title:

What are the current training and recovery practices of cyclists? – An online questionnaire approach

2.2 Layperson Description:

Briefly outline in simple terms the project's aim(s), justification, participant group(s), method and possible outcomes

While cycling is one of the fastest growing sports and recreational activities throughout the world, limited questionnaire research has been undertaken on the current training and recovery practices of masters' cyclists. The purpose of this study is gain information into the current training practices of cyclists through the use of an online questionnaire. The findings will both inform cycling stakeholders and provide a springboard for further PhD research.

The current study aims to inform the development of an online questionnaire adapted from two previously published questionnaires. The first questionnaire was developed by Dr. Will Hopkins and used in a study (Liow & Hopkins, 1996) that examined the training and performance of triathletes. The second questionnaire was used by Associate Professor Mike Climstein from Bond University (Australia) which was delivered to World Masters Games athletes in Sydney, Australia 2009 (Climstein et al., 2011). A copy of the proposed online questionnaire for the proposed research project is attached.

All Cycling Queensland members (see letter of support attached) will be emailed asking for their participation in a 15-minute online questionnaire, designed to examine their current training practices (email example attached). Cycling Queensland will place a link on their website through to this online questionnaire.

Later in the year the Pan Pacific Masters Games are being held on the Gold Coast in Queensland, Australia, with this event road and track cycling are being introduced for the first time, and an email of support has been given to enable our questionnaire to be delivered to the participants for this international event. (see email attached)

Participation is opt-in and voluntarily with withdrawal from the research being allowed at any time with no penalty. Once opened the information sheet at the start of the survey will inform the participants of the purpose of this study (attached). This again will clearly state that they are free to withdraw from the research at any time without penalty. Consent will be taken as they have started of the online questionnaire and this is clearly stated at the bottom of the informed consent information (see attached questionnaire)

The primary aim of this questionnaire is to inform the researchers of the current training practices of male and female masters cyclists. The questionnaire has been developed through the use of focus group methodology previously approved by the CQUniversity H.R.E.C. (approval number H12/05-076)

2.3 **Data collection dates:**

Start: 1 July 2012 End: 20 December 2012

2.4 **Data Collection methods: (Please tick methods as appropriate)**

- ☐ Interviews
- ☐ Focus Groups
- ☐ Hard Copy Survey
- ☒ Online Survey

Other (please specify)

2.5 **Research Methodology:**

Outline the proposed method, including data collection techniques, tasks participants will be asked to complete, estimated time commitment required of them, and how data will be analysed. Give a justification of your proposed sample size, including details of statistical power of the sample where appropriate

This research has the support of two distinct groups that have provided access to their memberships. Cycling Queensland has over 3300 active members and provides competitive cycling opportunities for all ages. The Second group is Pan Pacific Masters Games (PPMG) cycling competitors; these athletes have an age over 35 years. This is the first time cycling has been offered at the PPMG therefore numbers are unknown at present. They methods are similar but have been separated for clarity.

Cycling Queensland.

From an existing membership database developed and maintain by Cycling Queensland, an email will be sent to all current Cycling Queensland members (3300 in 2011) asking them to participate in the research. Each participant would receive in this email an invitation, an opt-in option, and a link to the start of the questionnaire (see email attached)

All Cyclists will be sent a second email by Cycling Queensland two weeks after the first email reminding them of their participation in the online questionnaire would be greatly appreciated. It will also state a close date on this second email to encourage immediate participation.

The proposed study will be using a "snowballing" methodology to increase participant numbers.

Pan Pacific Masters Games 2012 Cycling competitors

All registered competitors for the cycling events at the 2012 Pan Pacific Masters Games (3rd to 11th November) will be sent an email by the administrators for their sport with an invitation to participate in the same online questionnaire.

All Pan Pacific Cyclists will be sent a second email two weeks after the first email reminding them of their participation in the online questionnaire would be greatly appreciated. It will also state a close off date on this second email to encourage immediate participation.

This online questionnaire will be developed using Zoomerang for which CQUniversity has a license. The online questionnaire will take about 15 minutes to complete.

Once the online questionnaire access has expired, all questionnaires will be analyzed with a focus on training practices of different competitors. Data will be tabulated for subsequent statistical analysis. Both descriptive and inferential statistical analysis will be undertaken to examine the effects of gender, age and level of competition on the data collected.

2.6 **Research Aims and Significance:**

State the aims, research objectives, key research questions, and significance of the project. Where relevent, state the specific hypothesis to be tested. Also, please provide a brief description of the relevance of your proposed project to current research, a justification as to why your research should proceed and an explanation of any expected benefits to the community or its potential to contribute to existing knowledge.

The purpose of this research is examine the current training and recovery practices undertaken by masters cyclists At present the preferred method to obtain training data is for the individual participants to fill in training logs. However, at present most athletes that are training for an event keep their own individual training log.

To date there is limited knowledge about the training and recovery practices of masters cyclists. This would be the first questionnaire of its type, leading to the first published information on the training and recovery practices of masters' cyclists.

It will supply valuable information to the cycling peak bodies (Cycling Queensland and Cycling Australia), Pan Pacific Masters Games organizers, and the wider cycling community. Moreover, it will also form a baseline in future PhD research into masters' cyclists.

As the questionnaire has been developed to be specific to this population (via focus group input) therefore allowing this group to better understand the questions and thus decreasing the time taken to complete the online questionnaire.

2.7 **Risk:**

Please outline the likelihood and severity of the risks to participants/others.

Involvement in this study is totally opt-in and voluntary. The likelihood of harm and consequences of any involvement in completing the questionnaire is minimal.

The questionnaire should take approximately 15 minutes to complete.

The information sheet at the start of the questionnaire will clearly inform participants that they are free to withdraw their participation at any stage of the project without any penalty or prejudice.

Please identify who (participants and/or others) the risk may affect.

Each online questionnaire respondent will be not be known to the researcher as the questionnaire is online and any personal information gathered has to be collated separately from the questionnaire. The questionnaire has no place for the respondents to place their personal contact details in it.

Please outline the mechanisms taken to minimise the risk.

To minimize risk, participants will be reassured that the research team will not be able identify them. It is an opt-in online questionnaire and it is voluntary. The emails and the link to the prospective participants will be sent by Cycling Queensland or placed on Cycling Queensland's website. The research team will not directly contact the participants.

Similarly, Pan Pacific Masters Games administrators will send an email invitation to all cycling competitors asking them to participate in the online current training practices questionnaire. The research team will not directly contact the participants.

All data collected from the participants will be stored electronically. Data will then be stored on a computer that is password-protected and data stored on other electronic devices will be stored in a secure, locked cabinet in the researchers office. Once analyzed, hard copies of any data (such as print out of results) once analyzed, will be stored in the same locked cupboard and office, stored for the required period of time (5 years post last publication).

Please indicate the potential benefits of the research.

It will allow the participants in cycling to gain more incite into their own training practices. This is the first known research of its kind including masters cyclists.

To whom the benefits are likely to accrue.

Cycling Queensland, Cycling Australia, Masters cyclists, Pan Pacific Masters Games cyclists, Masters Athletes. Research team.

PART 3 FUNDING AND FINANCE

Researchers should include any source of funding (e.g., departmental, commercial, non-commercial, government) – National Statement on Ethical Conduct in Human Research 2007, Chapter 5.4.

3.1 Has this protocol received research funding or is this submission being made as part of an application for research funding?

☒ YES ☐ NO

3.2 What is the source of funding and has the funding been approved?

☐ YES ☒ NO

CQUniversity Research Higher Degree of Exercise and Sport Science $2000. Funding is dependent upon successful DPORS and ethics.

3.3 Will the researcher receive any remuneration and/or in kind funding to perform this research?

☐ YES ☒ NO

If yes, please provide details:

3.4 **Will participants receive any payment or expenses for participation in the research?**

☐ YES ☒ NO

If yes, please provide details:

PART 4 OTHER APPROVALS

The principal researcher is responsible for informing each HREC of all other Australian sites at which the research is being proposed or conducted, at the time of submission of the research project, of any previous decisions regarding the research made by another HREC, and informing each HREC of whether the protocol is presently before another HREC (National Statement, Chapter 5.3).

4.1 **Is this protocol being submitted or has it been previously submitted to another ethics committee?**

☐ YES ☒ NO

4.2 **If yes, give details of other centres involved; the approval status of the study at each centre; and details of any required amendments.**

4.3 **Other external approvals/reviews?**

If your research has undergone peer review, review from a funding body or involves participants from other organisations, copies of letters of approval or reviews must be attached to this application (if pending at the time the application is submitted, forward to Ethics and Compliance Officer when available). In some cases, institutions/authorities may decline to provide approval letters until ethics approval has been granted. In such cases, you should submit your application to the HREC for provisional approval pending receipt of the documentation.

4.4 **Has the research undergone peer review, review from a funding body or does it involve participants from other organisations?**

☒ YES ☐ NO If yes, specify from whom and attach a copy.

Letter from Cycling Queensland (see attached)

Supervisor Associate Professor Peter Reaburn

Co-supervisor Dr. Marko Korhonen

Email from Pan Pacific Masters Games (see attached)

PART 5 RECRUITMENT OF PARTICIPANTS

5.1 **Provide number, age range and source of participants. This explanation should also include how potential participants will be identified and how initial contact will be made. For CQUniversity staff recruiting students as participants, please note that approval to access students is required from either the Executive Dean of the faculty, or from the Executive Director (Corporate Services), depending on whether you are involving students from one faculty, or from across all faculties.**

All male and female Cycling Queensland members.Initial contact made by Cycling Queensland

All Pan Pacific Masters Games 2012 cyclists. Initial contact made by Pan Pacific Masters Games adminstrators.

5.2 **What is the proposed method of recruitment of participants?**

Cycling Queensland

Participation will be opt-in and voluntary. It is based on their active membership with Cycling Queensland. An email will be sent to all active members of Cycling Queensland. The email will state that this is an Opt in, voluntary questionnaire and that they are free to withdraw from the project at any time for any reason without penalty or prejudice. (email attached)

Pan Pacific Masters Games

The administrators, upon cyclist registration to participate in cycling events at the 2012 Pan Pacific Masters Games (November), will send an email. The email will state that this is an opt-in, voluntary questionnaire and that they are free to withdraw from the project at any time for any reason without penalty or prejudice.(email attached).

PART 6 CONSENT

The potential participants must be provided with information at their level of comprehension about the purpose, methods, demands, risks, inconveniences, discomforts and possible outcomes of the research (including the likelihood and form of publication of research results).

Informing participants: Participants Information Sheet and Consent Form

6.1 Will the research involve informed consent of participants?

☒ YES ☐ NO

6.2 If yes, how will informed consent be obtained/recorded? If no, please justify why consent will not be obtained.

Information pages (attached) at the start of the questionnaire will also state that they are free to withdraw from the project at any time for any reason without penalty or prejudice.

Informed consent (attached) will be granted once they have started the questionnaire. This is given as starting the questionnaire clearly states this at the bottom of the informed consent page before they are able to undertake the online questionnaire.

PART 7 INFORMATION PROTECTION (Confidentiality, Data Storage, Security and Disposal)

Confidentiality:

7.1 Explain what methods will be used to guarantee confidentiality/anonymity of participant data.

No identifying data will be collected on this questionnaire.

No individualized identifying information will be requested as part of the online questionnaire. Data will be databased and aggregated. The originals responses will be stored on a password protected website on the CQUniversity server. In the data no names will be used and no other identifying means available will be used. At no time will the real names of participants appear in any published documents.

Data Storage and security:

7.2 Explain how and where data will be held, including any arrangements for data security during the project?

Data will be stored on password protected computer will be password protected and any other data stored on other electronic devices will be stored in a secure, locked cabinet in the researchers office. Once analyzed, will be placed in a locked cupboard in the same locked office for the required period of time (5 years post last publication) in accordance with the CQUniversity Code of Conduct for Research.

7.3 Please outline how long the data will be kept?

Data will be kept for the 5 years past last publication in accordance with the CQUniversity Code of Conduct for Research.

7.4 Will the data be disposed of at some point?

☒ YES ☐ NO

7.5 If yes, how will the data be disposed of? If no, why is the data to be retained, and how/where will it be stored.

Files will be deleted from the server. Hard copies will be placed in the document destruction bins on campus to be shredded.

PART 8 DISSEMINATION OF RESULTS

8.1 Explain when, how, where and to whom results will be disseminated, including whether participants will be provided with information on the findings or outcomes of the project.

The results will form part of a Masters of Human Movement Science thesis, providing a baseline to gain valuable information into the current training practices of masters cyclists. The Questionnaire will be used to survey Masters cyclists throughout Queensland. From this thesis there will be an ongoing series of research projects that will combine to form a number of publications, conference papers and workshops. Following the competition of the questionnaire analysis, a brief plain English statement about the results will be supplied back to Cycling Queensland, Pan Pacific 2012 Masters Games administrators and Cycling Australia, therefore informing that participants and other members of the cycling community about the results

PART 9 DECLARATIONS

Signatures and undertakings:

Applicant/Principal Researchers (including students and supervisors where appropriate)

I/We certify that:

- All information is correct and complete as possible;
- I/We have had access to and read the NHMRC 'National Statement on Ethical Conduct in Human Research', (2007);
- The research will be conducted in accordance with the National Statement;
- I/We have consulted any relevant legislation and regulations, and the research will be conducted in accordance with these;
- I/We will immediately report to the HREC anything that might warrant review of the ethical approval of the research including:
  - Serious or unexpected adverse effects on participants
  - Proposed changes in the protocol; and
  - Unforseen events that might affect continued ethical acceptability of the project;
- I/We have attempted to identify all the risks related to the research that may arise in conducting this research and acknowledge my/our obligations and the rights of participants;
- I/We will not continue the research if ethical approval or site authorisation is withdrawn and will comply with any special conditions required by the HREC, including:
  - Conditions of approval stipulated by the HREC; and
  - Cooperate with monitoring requirements. At a minimum annual progress reports and a final report will be provided to the HREC
- I/We have the appropriate qualifications, experience and facilities to conduct the research set out in the attached application and to deal with any emergencies and contingencies related to the research that may arise;

Signature Redacted

Print Name	Signature	Date
Peter Reaburn		22/6/12
Caroline MacGregor	Signature Redacted	22/6/12
Naoko Kohonoki	EMAIL ATTACHED	21/6/12

Campbell Macgregor

From: Korhonen Marko [marko.korhonen@sport.jyu.fi]
Sent: Thursday, 21 June 2012 7:26 PM
To: Campbell Macgregor
Cc: Peter Reaburn
Subject: Re: Declaration for ethics
Attachments: image001.jpg

I confirm to accept and sign the ethics form of the project "What are the current training and recovery practices of masters cyclists? An online questionnaire approach"

Name:
Marko Korhonen

"Campbell Macgregor" <c.macgregor@cqu.edu.au> kirjoitti 21.6.2012 kello 10.30:

> Hi Marko,
>
> Can you please reply to this email stating that you are happy to sign the ethics form attached.
>
> Have a meeting with Peter tomorrow and hopefully will be handing this all in then.
>
>
> Regards,
>
> Cam
>
> Campbell Macgregor
> Tutor/Masters student
> BPhEd, ESSAM AEP, Cert IV TAE.
> Exercise and Sport Sciences
> CQUniversity Australia - Rockhampton Campus Bldg 81, Room 1.16.
> Bruce Highway Rockhampton QLD 4701
> Telephone: +61 7 4923 2539
>
> Email: c.macgregor@cqu.edu.au<mailto:c.dawes@cqu.edu.au>
> Website: www.cqu.edu.au<http://www.cqu.edu.au/>
>
> [cid:image001.jpg@01CCB9A7.C73ECB40]
>
> This message is intended only for the addressee, and may contain legally sensitive or privileged information. If you are not the addressee and have received this message in error, please delete it and advise the sender accordingly.
> The sender makes no guarantees as to the freedom of this message or any attachments from malware, and recommends that you take all necessary steps to protect your computer system and data integrity from such content.
>
> <image001.jpg>
> <Final document questionnaire low risk form.doc>

Chandler Velodrome
Sleeman Sports Complex
Cnr Old Cleveland and Tilley Rds
Chandler QLD 4155
PO Box 4115 Gumdale QLD 4154
T: 07 3390 1477
F: 07 3390 2852
E: qld.info@cycling.org.au

Mr Campbell Macgregor
Exercise and Sports Science
CQ University Australia
Rockhampton Campus
Building 81 Room 1.16
Bruce Highway
Rockhampton QLD 4701

20 April 2012

Cam

I write to confirm Cycling Queensland's support for the study being undertaken by Associate Professor Peter Reaburn and yourself in relation to Masters Cyclists in Queensland. It is commendable that the study is focussing on Masters as it is usual for the focus to be on younger groups and at the high performance program level.

The Association would be please to assist the study and the Business Services Officer, Mr Lachlan Paull, will be the contact at Cycling Queensland to provide any assistance required.

Yours Sincerely

Signature Redacted

Geoff Rynne
CEO
Cycling Queensland

Dear Cycling Queensland Members,

Invitation

Current training and recovery practices of Queensland cyclists

START DATE: Now

END DATE - Closes Midnight 30th August 2012

An opportunity has been presented to all our members to participate in an online questionnaire, that is looking at your current training and recovery practices.

This offer is for cyclists aged 18 and over. It is to inform the researchers (Associate Professor Peter Reaburn and Mr. Campbell Macgregor) about current training and recovery practices.

The online questionnaire, will simply be a series of questions about your current training habits, it is anticipated to take about 10 minutes to complete.

Please read the information sheet at the start of the online questionnaire and if you have any questions please contact the postgraduate researcher, Mr Campbell Macgregor, via email at c.macgregor@cqu.edu.au.

An information sheet and an informed consent form are before the start of the questionnaire. Please read both forms before starting the questionnaire. Starting of the questionnaire provides the researchers with informed consent.

This link will take you directly to the information sheet at the start of the questionnaire.
(INSERT LIVE LINK HERE)

Both Peter and Campbell look forward to your responses.

Regards

Cycling Queensland

0%

Current training and recovery practices of Queensland cyclists

Project Overview

The purpose of this project is to examine the training and recovery practices of Queensland cyclists, as very little is known about these practices in the cycling population. This research project will seek to identify any patterns or trends to inform future studies.

Participation Procedure

Participation in this project will involve reading and responding to a series of questions, regarding your training and recovery practices The survey should take less than 20 minutes to complete. Choosing to participate, or choosing not to participate, will not affect your employment or academic standing in any way.

Outcome/Publication of Results

The results of this research project will be used for a thesis, required for the completion of a Masters in Sports Science. The results may also be used in future journal publications, or conference presentations. Results will only be used in aggregate form for these purposes.

Right to Withdraw

You have the right to withdraw from this project at any stage up until you submit your responses; due to the anonymous nature of this survey, once your responses have been submitted, we will be unable to retrieve or remove them. You can withdraw by simply closing the survey window. Withdrawing from this project will not affect your Cycling Queensland membership or employment standing in any way.

[redacted]

Secretary, Human Research Ethics Committee
Ph: 07 4923 2603
Fax: 07 4923 2600
Email: ethics@cqu.edu.au

CQUniversity AUSTRALIA
CELEBRATING 20 YEARS
BE WHAT YOU WANT TO BE

A/Prof Peter Reaburn
School of Medical and Applied Sciences
Building 81
Rockhampton Campus

25 June 2012

Dear A/Prof Reaburn

HUMAN RESEARCH ETHICS COMMITTEE ETHICAL APPROVAL PROJECT: H12/06-135 *WHAT ARE THE CURRENT TRAINING AND RECOVERY PRACTICES OF CYCLISTS? - AN ONLINE QUESTIONNAIRE APPROACH*

The Human Research Ethics Committee is an approved institutional ethics committee constituted in accord with guidelines formulated by the National Health and Medical Research Council (NHMRC) and governed by policies and procedures consistent with principles as contained in publications such as the joint Universities Australia and NHMRC *Australian Code for the Responsible Conduct of Research.* This is available at http://www.nhmrc.gov.au/publications/synopses/_files/r39.pdf.

On 29 June 2012, the Chair of the Human Research Ethics Committee considered your application under the Low Risk Review Process. This letter confirms that your project has been granted approval under this process, pending ratification by the full committee at its July 2012 meeting.

The period of ethics approval will be from 25 June 2012 to 20 December 2012. The approval number is H12/06-135; please quote this number in all dealings with the Committee. HREC wishes you well with the undertaking of the project and looks forward to receiving the final report.

The standard conditions of approval for this research project are that:

(a) you conduct the research project strictly in accordance with the proposal submitted and granted ethics approval, including any amendments required to be made to the proposal by the Human Research Ethics Committee;

(b) you advise the Human Research Ethics Committee (email ethics@cqu.edu.au) immediately if any complaints are made, or expressions of concern are raised, or any other issue in relation to the project which may warrant review of ethics approval of the project. *(A written report detailing the adverse occurrence or unforeseen event must be submitted to the Committee Chair within one working day after the event.)*

(c) you make submission to the Human Research Ethics Committee for approval of any proposed variations or modifications to the approved project before making any such changes;

(d) you provide the Human Research Ethics Committee with a written "Annual Report" on each anniversary date of approval (for projects of greater than 12 months) and "Final Report" by no later than one (1) month after the approval expiry date; *(A copy of the reporting pro formas may be obtained from the Human Research Ethics Committee Secretary, Sue Evans please contact at the telephone or email given on the first page.)*

(e) you accept that the Human Research Ethics Committee reserves the right to conduct scheduled or random inspections to confirm that the project is being conducted in accordance to its approval. Inspections may include asking questions of the research team, inspecting all consent documents and records and being guided through any physical experiments associated with the project

(f) if the research project is discontinued, you advise the Committee in writing within five (5) working days of the discontinuation;

(g) A copy of the Statement of Findings is provided to the Human Research Ethics Committee when it is forwarded to participants.

Please note that failure to comply with the conditions of approval and the *National Statement on Ethical Conduct in Human Research* may result in withdrawal of approval for the project.

You are required to advise the Secretary in writing within five (5) working days if this project does not proceed for any reason. In the event that you require an extension of ethics approval for this project, please make written application in advance of the end-date of this approval. The research cannot continue beyond the end date of approval unless the Committee has granted an extension of ethics approval. Extensions of approval cannot be granted retrospectively. Should you need an extension but not apply for this before the end-date of the approval then a full new application for approval must be submitted to the Secretary for the Committee to consider.

The Human Research Ethics Committee wishes to support researchers in achieving positive research outcomes. If you have issues where the Human Research Ethics Committee may be of assistance or have any queries in relation to this approval please do not hesitate to contact the Secretary, Sue Evans or myself.

Yours sincerely,

Signature Redacted

Professor Phillip Ebrall
Chair, Human Research Ethics Committee

Cc: Mr Campbell McGregor (student), Dr Marko Korhonen (associate supervisor)
Project file

Approved

Appendix D

Online questionnaire.

Welcome to a questionnaire conducted by CQUniversity and Cycling Queensland.

Project Overview

The purpose of this project is to examine the training and recovery practices of Queensland cyclists, as very little is known about these practices in the cycling population. This research project will seek to identify any patterns or trends to inform future studies.

Participation Procedure

Participation in this project will involve reading and responding to a series of questions, regarding your training and recovery practices The survey should take less than 20 minutes to complete. Choosing to participate, or choosing no to participate, will not affect your employment or academic standing in any way.

Outcome/Publication of Results

The results of this research project will be used for a thesis, required for the completion of a Masters in Sports Science. The results may also be used in future journal publications, or conference presentations. Results will only be used in aggregate form for these purposes.

Right to Withdraw

You have the right to withdraw from this project at any stage up until you submit your responses; due to the anonymous nature of this survey, once your responses have been submitted, we will be unable to retrieve or remove them. You can withdraw by simply closing the survey window. Withdrawing from this project will not affect your Cycling Queensland membership or employment standing in any way.

There are no foreseeable serious risks to participating in this project. If participation does cause any distress or discomfort, you are encouraged to access counselling services via Lifeline (13 11 14).

Feedback

If you are interested in the outcomes of this research, a Plain English Statement of Results will be posted at the following Cycling Queensland website at the conclusion of the project

Questions/Further Information

If you have any questions, or require further information, the postgraduate researcher,Mr Campbell Macgregor, can be contacted at c.macgregor@cqu.edu.au. The researcher's supervisor, Associate Professor Peter Reaburn, can be contacted at p.reaburn@cqu.edu.au.

Concerns/Complaints

If you have any concerns about the nature and/or conduct of this research project, please contact the CQUniversity Office of Research (Tel: 07 4923 2603; email: ethics@cqu.edu.au; Mailing Address: Building 361, CQUniversity, Rockhampton, QLD, 4702)

Informed Consent

I consent to participation in this research project and agree that:

1. Detailed information has been provided to me above, that I have read and understood;

2. I have had any questions I had about the project answered to my satisfaction by this information;

3. I understand that my participation or non-participation in the research project will not affect my Cycling Queensland membership or employment;

4. I understand that I have the right to withdraw from the project at any time without penalty;

5. I understand that the research findings will be included in the researcher's publication(s) on the project and this may include conferences and articles written for journals and other methods of dissemination stated in the information above;

6. I am aware that a Plain English Statement of Results will be made available on the Cycling Queensland Website.

7. I agree that, by starting this survey and then submitting it, I am providing informed consent to participate in this project.

***1. What is your age at the time of this online questionnaire?**

Age in years _____

2. Gender

- [ ] Male
- [ ] Female

3. What is your height?

cm

4. What is your weight?

kg

5.

Please indicate the industry you work in from the following categories:

- ◯ Accounting
- ◯ Administration & Office Support
- ◯ Advertising, Arts & Media
- ◯ Banking & Financial Services
- ◯ Call Centre & Customer Service
- ◯ CEO & General Management
- ◯ Community Services & Development
- ◯ Construction
- ◯ Consulting & Strategy
- ◯ Design & Architecture
- ◯ Education & Training
- ◯ Engineering
- ◯ Farming, Animals & Conservation
- ◯ Government & Defence
- ◯ Healthcare & Medical
- ◯ Hospitality & Tourism
- ◯ Human Resources & Recruitment
- ◯ Information & Communication Technology
- ◯ Insurance & Superannuation
- ◯ Legal
- ◯ Manufacturing, Transport & Logistics
- ◯ Marketing & Communications
- ◯ Mining, Resources & Energy
- ◯ Real Estate & Property
- ◯ Retail & Consumer Products
- ◯ Sales
- ◯ Science & Technology

- ◯ Self Employment
- ◯ Sport & Recreation
- ◯ Trades & Services
- ◯ Student
- ◯ Other, please specify

6.

Please indicate the highest level of education that you have completed.

- ◯ Year 10
- ◯ Year 12
- ◯ TAFE/Apprenticeship
- ◯ University - undergraduate degree
- ◯ University - post graduate degree
- ◯ Other, please specify

7.

Please indicate below your primary sport (the one that you spend the most time playing, training for, etc.).

- ◯ Aerobics
- ◯ Athletics
- ◯ Australian Rules Football
- ◯ Basketball (outdoor and/or indoor)
- ◯ Boxing
- ◯ Cricket (outdoor and/or indoor)
- ◯ Cycling
- ◯ Dancing
- ◯ Fishing
- ◯ Football/Soccer (outdoor and/or indoor)
- ◯ Golf
- ◯ Gym (gymnasium work-outs)
- ◯ Hockey (outdoor and/or indoor)
- ◯ Martial Arts
- ◯ Netball (outdoor and/or indoor)
- ◯ Racquet sports (squash, tennis)
- ◯ Rodeo/Equestrian
- ◯ Rowing
- ◯ Rugby League
- ◯ Rugby Union
- ◯ Other Football Code (e.g., gridiron, touch football)
- ◯ Running
- ◯ Sailing
- ◯ Squash
- ◯ Surf Sports
- ◯ Swimming/Diving
- ◯ Tennis
- ◯ Triathlon
- ◯ Volleyball
- ◯ Walking/Running
- ◯ Weight Training/Body Building
- ◯ Yoga/Pilates
- ◯ Other, please specify _____

8.

Please indicate below any other sport/activity you currently do? (any that you have spent time playing, training for in the past year.)

- [ ] Aerobics
- [ ] Athletics
- [ ] Australian Rules Football
- [ ] Basketball (outdoor and/or indoor)
- [ ] Boxing
- [ ] Cricket (outdoor and/or indoor)
- [ ] Cycling
- [ ] Dancing
- [ ] Fishing
- [ ] Football/Soccer (outdoor and/or indoor)
- [ ] Golf
- [ ] Gym (gymnasium work-outs)
- [ ] Hockey (outdoor and/or indoor)
- [ ] Martial Arts
- [ ] Netball (outdoor and/or indoor)
- [ ] Racquet sports (squash, tennis)
- [ ] Rodeo/Equestrian
- [ ] Rowing
- [ ] Rugby League
- [ ] Rugby Union
- [ ] Other Football Code (e.g., gridiron, touch football)
- [ ] Running
- [ ] Sailing
- [ ] Squash
- [ ] Surf Sports
- [ ] Swimming/Diving
- [ ] Tennis
- [ ] Triathlon
- [ ] Volleyball
- [ ] Walking/Running
- [ ] Weight Training/Body Building
- [ ] Yoga/Pilates
- [ ] Other, please specify

***9. What is the highest level you have competed in cycling in the last 12 months?**

***10. What is the highest level you have competed at in cycling in your lifetime?**

11. Please indicate your level of your income per week for the past year.

12.

How many times a week do you undertake cycling training on average?

13.

With no limitations, how many times would you train for cycling a week? (A perfect cycling training world for you)

14. Over the last 12 months, as an average per week, please indicate.

Trainings per week for cycling.

Average km per week on the bike.

15. How many total years have you been competing in cycling?

- ◯ Never competed
- ◯ >12 month
- ◯ 1-2 years
- ◯ 3-5 years
- ◯ 6-10 years
- ◯ 11-20 years
- ◯ 21-30 years
- ◯ 31-40 years
- ◯ 40+ years

***16. How many total <u>years</u> have you been consistently training for cycling?**

- ◯ >12 month
- ◯ 1-2 years
- ◯ 3-5 years
- ◯ 6-10 years
- ◯ 11-20 years
- ◯ 21-30 years
- ◯ 31-40 years
- ◯ 40+ years

***17. In cycling are you a Track, Road or Mountain Bike cyclist? (tick all that apply)**

- ☐ Track
- ☐ Road
- ☐ Mountain Bike
- ☐ If more than one, indicate your main competition one is ?

_____

18. What do you see as the major benefits for participating in cycling?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Meet more people	◯	◯	◯	◯	◯
Makes me feel good about life	◯	◯	◯	◯	◯
Improves my health	◯	◯	◯	◯	◯
Increases my self-esteem	◯	◯	◯	◯	◯
Motivates me to get out more	◯	◯	◯	◯	◯
Helps me to be more energetic	◯	◯	◯	◯	◯
Helps my heart and lungs function better	◯	◯	◯	◯	◯
Decreases my tension and/or stress	◯	◯	◯	◯	◯
Increases my physical strength	◯	◯	◯	◯	◯
Improves my sleep/physique	◯	◯	◯	◯	◯
Makes me feel more attractive	◯	◯	◯	◯	◯
Keeps me from getting sick	◯	◯	◯	◯	◯
Helps me cope with pain	◯	◯	◯	◯	◯

19. Who is responsible for designing your training program? (tick all that apply)

- ☐ Personal coach
- ☐ On-line coach
- ☐ Self coached
- ☐ Talking with other cyclists
- ☐ Coach and athlete together.

20. How often does a coach advise you about your cycling training ?

- ◯ Not at all
- ◯ Less than once a month
- ◯ Once or twice a month
- ◯ About once a week
- ◯ Several times a week

21. Please select the types of training you have had a training plan developed for. (please select all that apply)

- ☐ Endurance on the bike (longer rides)
- ☐ Endurance off the bike (running or swimming etc)
- ☐ Strength training on the bike (hills)
- ☐ Strength training off the bike (resistance/gym work)
- ☐ Speed/Power training on the bike (sprint work)
- ☐ Speed/Power training off the bike (plyometrics or Olympic lifting)
- ☐ Flexibility training (Stretching workout, yoga class)
- ☐ Skill training (rollers/starts etc)
- ☐ Fitness classes at the gym, Spin, Pilate's, Pump, Step, boxing.
- ☐ Other, please specify _____

22. Do you have a weekly training plan from a coach?

- ◯ Yes
- ◯ No
- ◯ Sometimes

23. Do you keep a training log?

- ◯ Yes
- ◯ No

24. Do you use the internet to inform you about what training program you should be doing?

- ◯ Yes
- ◯ No

25. If yes, please list the top 6 website you visit to gain cycling knowledge.

Website 1 _____

Website 2 _____

Website 3 _____

Website 4 _____

Website 5 _____

Website 6 _____

26. When training do you use any of the below? (tick all that apply)

- ☐ Computer based training log
- ☐ Heart rate monitor
- ☐ Cycling computer in watts
- ☐ Cycling computer in Km or Km/h
- ☐ Other, please specify

_____

27.

Out of the list below please rank them from least to most importance in what you think you should be undertaking in your training regime. 1 = least important 9 = most important.

☐	Endurance on the bike (longer rides)
☐	Endurance off the bike (running or swimming etc)
☐	Strength training on the bike (hills)
☐	Strength training off the bike (resistance/gym work)
☐	Speed/Power training on the bike (sprint work)
☐	Speed/Power training off the bike (plyometrics or Olympic lifting)
☐	Flexibility training (Stretching workout, yoga class)
☐	Skill training (rollers/starts etc)
☐	Fitness classes at the gym, Spin, Pilate's, Pump, Step, Boxing.

28. Please select the types of training you have done within your previous year. (please select all that apply)

- ☐ Endurance on the bike (longer rides)
- ☐ Endurance off the bike (running or swimming etc)
- ☐ Strength training on the bike (hills)
- ☐ Strength training off the bike (resistance/gym work)
- ☐ Speed/Power training on the bike (sprint work)
- ☐ Speed/Power training off the bike (plyometrics or Olympic lifting)
- ☐ Flexibility training (Stretching workout, yoga class)
- ☐ Skill training (rollers/starts etc)
- ☐ Fitness classes at the gym, Spin, Pilate's, Pump, Step, boxing.
- ☐ Other, please specify

_____

All questions on this page refer to the title question below.

What do you see as the major constraints to you participating in cycling?

29. Community linked

	never	almost never	neutral	often	very often
a. Lack of equipment	○	○	○	○	○
b. Lack of places to ride	○	○	○	○	○
c. Lack of knowledge	○	○	○	○	○
d. Lack of skills	○	○	○	○	○

30. Social influences

	never	almost never	neutral	often	very often
a. Discouragement from friends	○	○	○	○	○
b. Lack of interest	○	○	○	○	○
c. Lack of time	○	○	○	○	○
d. Lack of company	○	○	○	○	○

31. Intrapersonal

	never	almost never	neutral	often	very often
a. Lack of good health	○	○	○	○	○
b. Fear of injury	○	○	○	○	○
c. Self-consciousness	○	○	○	○	○
d. Lack of self-discipline	○	○	○	○	○

TRAINING PHASES - in many sports athletes break down their training into phases. To get a better understanding of your training please read the below definitions and fill out the following training phases questions.

General Prep (Build-up or pre-season) Where you undertake all the base work for the competition you are working towards.

Specific Prep (Competition or in-season) Where you undertake specific training usually looking at actual events that you will be attending.

Off season (Non competition) Where you are letting your body recover from the previous season activity and you do not have any major competitions.

If you only use

1 phase : Some people train the same all year around use general prep phase.

2 phases : For people that have two phases use general prep and off season.

3 phases : fill in all phases provided

4+ phases : fit them into the three provided.

We will also be talking about a Taper where you are backing off your training just before a major event.

32. I break my training down into phases

- ☐ Yes - I change my training depending on the weather/seasons
- ☐ Yes - I change my training depending on the event/competition
- ☐ No - I train the same month in month out.
- ☐ Yes - I change my training.. please specify

_____

Please show the duration of each phase in your program below. Along with the amount of Km's you would cycle in an average week during each phase.
Description

33. General Prep (Build-up or pre-season) Where you undertake all the base work for the competition you are working towards.

Time in weeks _____

Average Km's per week _____

Number of training sessions per week _____

34. Specific Prep (Competition or in-season) Where you undertake specific training usually looking at actual events that you will be attending.

Time in weeks _____

Average Km's per week _____

Number of training sessions per week _____

35. When coming up to an event I change my training by decreasing it and I usually undertake this taper _____ before the event.

Time in days _____

36. Off-season (Non competition) Where you are letting your body recover from the previous season activity and you do not have any major competitions.

Time in weeks _____

Average Km's per week _____

Number of training sessions per week _____

Intensity for this next question is defined as.

Very Hard - eg race pace or above

Hard - eg Hills, pace line

Moderate - front of the bunch riding

Light - eg long light-paced distance, bunch riding

Easy - eg easy spin in small gears

37. How hard is your training over the year and then in each phase in an average week.

	Easy	Light	Moderate	Hard	Very Hard
Over the last 12 months	○	○	○	○	○
General prep	○	○	○	○	○
Specific prep	○	○	○	○	○
Off-season	○	○	○	○	○

38. Please describe any part of your training not included in these three phases and a taper over the last 12 months:

This page is about GENERAL PREP phase in your training. Please answer the questions for an average week with NO issues that limited your training. If possible please refer to your log book

General Prep (build-up or pre-season) Where you undertake all the base work for the competition you are working towards.

***39. Total time spent in training each week, in Hours. (including any cross training)**

Time in Hours _____

40. Of this time how much is spent on the bike?

Hours _____

41. Endurance training (non-stop exercise and intervals, each lasting 3 minutes or more) Show total time each week at Race pace or faster

Hours _____

42. Endurance training (non-stop exercise and intervals, each lasting 3 minutes or more) Show total time each week at slower than race pace.

Hours

43. Interval training (each interval or rep lasting less than 3 minutes)

Hours

44. Strength training (also resistance training off the bike) Time undertaking hard or exhausting workouts (including rests)

Hours

45. Strength training (also resistance training off the bike) Time undertaking moderate and easy workouts (including rests)

Hours

46. Flexibility training (stretching)

Hours

47. Skill training, other training including technique or form training Total time each week (including rests).

Hours

This page is about SPECIFIC PREP phase in your training. Please answer the questions for an average week with NO issues that limited your training. If possible please refer to your log book

Specific Prep (Competition or in-season) Where you undertake specific training usually looking at actual events that you will be attending.

48. Total time spent in training each week. (including cross training)

Hours

49. Of this time how much is spent on the bike?

Hours

50. Endurance training (non-stop exercise and intervals, each lasting 3 minutes or more) Show total time each week at Race pace or faster.

Hours

51. Endurance training (non-stop exercise and intervals, each lasting 3 minutes or more) Show total time each week at slower than race pace.

Hours

52. Interval training (each interval or rep lasting less than 3 minutes).

Hours

53. Strength training (also resistance training off the bike) Time undertaking hard or exhausting workouts (including rests)

Hours

54. Strength training (also resistance training off the bike) Time undertaking moderate and easy workouts (including rests)

Hours

55. Flexibility training (stretching)

Hours

56. Skill training, other training including technique or form training Total time each week (including rests).

Hours

This page is about OFF-SEASON phase in your training. Please answer the questions for an average week with NO issues that limited your training. If possible please refer to your log book

Off season (Non competition) Where you are letting your body recover from the previous season activity and you do not have any major competitions.

57. Total time spent in training each week. (including cross training)

Hours

58. Of this time how much is spent on the bike?

Hours

59. Endurance training (non-stop exercise and intervals, each lasting 3 minutes or more) Show total time each week at Race pace or faster.

Hours

60. Endurance training (non-stop exercise and intervals, each lasting 3 minutes or more) Show total time each week at slower than race pace.

Hours

61. Interval training (each interval or rep lasting less than 3 minutes).

Hours

62. Strength training (also resistance training off the bike) Time undertaking hard or exhausting workouts (including rests).

Hours

63. Strength training (also resistance training off the bike) Time undertaking moderate and easy workouts (including rests).

Hours

64. Flexibility training (stretching).

Hours

65. Skill training, other training including technique or form training Total time each week (including rests).

Hours

66.

Are there any other forms of exercise you do in your off-season phase? (please list top 6)

Exercise 1 _____

Exercise 2 _____

Exercise 3 _____

Exercise 4 _____

Exercise 5 _____

Exercise 6 _____

This page is about a TAPER that you may use in your training. Please answer the questions for how you would usually taper with NO issues that limited your training. If possible please refer to your log book

67. Do you taper? (if no please move to the next page)

◯ Yes

◯ No

68. How many days before your most important competition for the last year did you start to taper?

Time in days _____

69. How many days before an important competition do you have your last training session?

Time in days _____

70. How do you taper ?

◯ I reduce the distance/time of my training

◯ I reduce the intensity or my training

◯ I reduce the frequency of my training

◯ Other strategy, please specify

_____

71. During the taper, how do you change the TIME SPENT on each of these types of training ?

	eliminate	decrease	no change	increase
Endurance	◯	◯	◯	◯
Interval (NOT counting rests)	◯	◯	◯	◯
Rests between each interval or rep during interval training	◯	◯	◯	◯
Strength	◯	◯	◯	◯
Flexibility	◯	◯	◯	◯
Skill or other training	◯	◯	◯	◯

72. During the taper, how do you change the INTENSITY on each of these types of training ?

	Eliminate	decrease	no change	increase
Endurance	○	○	○	○
Interval	○	○	○	○
Strength	○	○	○	○

73.

Please list any issues or reasons that may have caused you not to train as planned in the last 6 months. eg. weather, family commitments, work, study etc..

Answer 1 _____

Answer 2 _____

Answer 3 _____

Answer 4 _____

Answer 5

Answer 6

74. Have you ever experienced any of the following physical and functional symptoms? (tick all that apply)

- [ ] Increased breathing frequency
- [ ] Decreased in aerobic power (really hard to catch your breath)
- [ ] Abnormal T-wave pattern in ECG (if you use an ECG)
- [ ] Decreased maximal muscle power output (legs feel dead)
- [ ] Weight loss
- [ ] Persistent fatigue
- [ ] Delayed recovery from injury
- [ ] Decreased heart rate at rest or during sub maximal exercise
- [ ] Postural hypo tension (dizzy on standing)
- [ ] Decreased appetite
- [ ] Decreased muscular strength
- [ ] Loss of body fat
- [ ] Elevated body temperature
- [ ] Changes in resting blood pressure
- [ ] Elevated BMR
- [ ] Increased resting heart rate
- [ ] Increased fatigue
- [ ] Amenhorrea (Loss of normal period in females)
- [ ] Increased incidence of injury
- [ ] Decreased training or competition performance
- [ ] Slower recovery after exercise
- [ ] Localized muscle soreness
- [ ] Elevated heart rate upon getting up in the morning (rising)
- [ ] Increased VO2 during standard sub maximal exercise (breath harder for less work)

75.

Have you experienced any of the following psychological symptoms? (please tick all that may apply)

- ☐ Loss of training and competition desire
- ☐ Decreased libido
- ☐ Depression
- ☐ Decreased perception of muscular strength
- ☐ Decreased Self-confidence
- ☐ Decreased general sense of well-being
- ☐ Changes in mood state and attitude
- ☐ Increased anxiety
- ☐ Decreased focus and concentration
- ☐ Increased irritability
- ☐ Tendency toward an increased need for sleep
- ☐ Low mood
- ☐ Apathy
- ☐ Increase perceived rating of exercise intensity
- ☐ Disturbed sleep patterns and difficulty in falling asleep

76. Do you use any recovery strategies after training?

- ○ Yes - everytime
- ○ Yes - sometimes
- ○ No

77. Do you use recovery strategies after competition?

- ○ Yes - everytime
- ○ Yes - sometimes
- ○ No

78.

Please select any recovery strategies you use consistently. (tick all that apply)

- [ ] Spa bath
- [ ] Active recovery (light training session)
- [ ] Stretching
- [ ] Carbohydrate protein mix
- [ ] Hot/cold showers
- [ ] Pool work/water running
- [ ] Massage
- [ ] Cold bath/ice bath
- [ ] Compression garments
- [ ] High glycemic index foods within 30 minutes
- [ ] Other, please specify _____

Appendix E

Student T-test and One-way ANOVA tables.

DISTANCE

Student T Test for the differences of distance biked by gender

Gender	Mean	SD	df	t	p-value
Male	243.28	107.38	180		
Female	249.83	85.16	26	-0.30	0.76
Total	244.13	104.60	207		

One-Way ANOVA for the differences of distance biked by age

	Sum of Squares	df	Mean Square	F	p-value
Between Groups	5,463.59	2	2,731.79		
Within Groups	2,259,538.89	205	11,022.14	0.25	0.78
Total	2,265,002.48	207			

FREQUENCY

Student T Test for the differences of frequency training by gender

Gender	Mean	SD	df	t	p-value
Male	4.42	1.65	181		
Female	4.58	1.54	27	-0.47	0.64
Total	4.44	1.64	208		

One-Way ANOVA for the differences of the respondents' training frequency by age

	Sum of Squares	df	Mean Square	F	p-value
Between Groups	17.34	2.00	8.67		
Within Groups	537.46	205.00	2.62	3.306	0.39
Total	554.80	207.00			

BMI

Student T Test for the differences of BMI by gender

Gender	Mean	SD	df	t	p-value
Male	24.87	2.63	180		
Female	22.62	2.95	26	4.08	0.00
Total	24.58	2.77	207		

One-Way ANOVA for the differences of the respondents' BMI by age

	Sum of Squares	df	Mean Square	F	p-value
Between Groups	1.87	2.00	0.94		
Within Groups	1,583.04	205.00	7.72	0.12	0.89
Total	1,584.91	207.00			