Chapter 4
Discussion

4.1 Results Appraisal
The figures in chapter three clearly demonstrate that triathletes come from wide and varied sporting backgrounds. However, in all four data groups, that is male and female sprint distance racers and male and female Olympic distance racers, there is a very strong trend towards a running or a swimming background. Although the data was gathered in a different manner to that of Baker et al (2005) this correspond to the work of Baker et al’s (2005) which found that running and swimming are the first sports to be embraced by triathletes followed by cycling. The huge numbers that participate in both of these sports, means that this result is hardly surprising. According to Running USA there are more than 16 million people running in the USA who are classed as “Frequent Runners”, running more than 100 days per year. Although the numbers in competitive swimming are considerably less at quarter of a million athletes, it’s worth noting that over 96% of USA Swimming’s membership is aged 18 and under. Just 3.6% of USA Swimming’s members are 19 and over, (USA Swimming Membership Demographics 2007) suggesting that the vast majority leave the sport leaving them free to pursue other interests. In Ireland, adult sport participation figures (Fahey, Layte & Gannon (2004)) show swimming as the most popular activity among of adults who play sport at 15%. Cycling features at number 5 in the Irish Adult sport participation figures, with 5% of the active population and it came ahead of jogging at number 10 with just 3%. This is surprising given that cycling was very much a poor third in the three sports for popularity among triathletes. This intimates that while cycling is enjoyed as active leisure it is much less popular as a competitive sport. The membership of USA cycling at just over fifty thousand would bear this out when compared with the numbers in running and swimming. In the analysis of which sporting background produced the fastest finishing times when compared with the other sporting backgrounds, there was a distinct lack of uniformity between the four groups. In the Male Sprint distance triathletes; there was a significant difference between the
finishing times of those coming from a swimming background and all of the other sporting backgrounds with the exception of running. In the female sprint distance athletes, the athletes coming from a swimming background were found to have an advantage, but only when compared with athletes who did not come from a sporting background. Athletes categorized as having sporting backgrounds from “Other Sports”, i.e. not one of the three triathlon sports, were also shown to have significantly faster finishing times than the athletes who came to triathlon with no previous sporting background. On the other hand, the female Olympic distance athletes showed no statistical difference between the five sporting background categories and in fact, the mean finishing time of the swimmers was slowest, with the exception of the athletes categorized by having no previous sporting background. Although swimmers had the fastest finishing times by over five minutes in the male Olympic distance results, there was no statistically significant difference between the groups. There is certainly a suggestion from the data, that swimming may offer an advantage and this would tie in to the perceptions of the athletes themselves as over 57% believed swimming to be the sport that offered an athlete entering triathlon the greatest advantage. 83% of that group viewed swimming as the most technically difficult of the three sports to master. This would strongly suggest that while swimming is not necessarily perceived to be an advantage in that it does not best equip the athlete to pick up the other sports, it is perceived to be a huge disadvantage to come in to triathlon and try to master the technical aspects of swimming from the beginning.

The grouping of the sporting background was not optimized to yield the most statistically valuable data. It made sense to condense the 38 sporting categories to a smaller number of groups but to put all categories outside the three sports of triathlon and “No Previous Sporting Background” together, was too broad a categorization. It would have made more sense to group the sports that would have had a close relationship with running like soccer, field hockey, cross country skiing etc. together as well as
those closely linked to swimming such as water polo and to some extent surfing. By putting all categories together, it does not allow for any meaningful data to be extracted from this “Other” group.

There was a greater degree of uniformity in the four groups when it came to the statistical analysis of athletes who employed periodisation. In the male sprint distance results, a significant difference was found between the athletes who employed periodisation and those who either did not or were unfamiliar with the concept. The same comparisons were also found to be statistically significant in the male Olympic distance athletes. While there was a significant difference between the Female sprint distance athletes who employed periodisation and the athletes were unaware of what periodisation involved, somewhat surprisingly, there was no difference between the athletes employing periodisation and those that are familiar with the concept but are not employing it in their own training program. These results suggest that there is certainly a benefit in employing periodisation which would tie in to Baker et al (2005) finding that the highest performing athletes follow periods of high training stress with periods of low stress. Conversely, the Female Olympic distance athletes showed no significant difference between the three groups. It’s possible that the reason there was no significant difference between the “High Performance” and “Regular” athletes in the female Olympic distance data could have been because of the small number of “High Performance” athletes in that group. In the other three groups, a very high percentage of the “High Performance” athletes applied periodisation to their training. However, there were only four “High Performance” athletes in the female Olympic distance group and two of those athletes were unfamiliar with the concept of periodisation. This means that the small number of lower “High Performance” times, would not significantly contribute to the group who employ periodisation, resulting in no statistically difference between the groups. Overall, there was a very high awareness of the concept of periodisation among triathletes. However it is not clear from the survey results if there is uniformity
among triathletes in their understanding of the correct application of periodisation in their training. This highlights the classic problem of using a survey; the data consists of what people “say” they do.

Laursen et al (2005) found that resistance training may improve endurance performance in runners although there was little empirical evidence to indicate that it would improve cycling performance. Athletes were asked whether or not they included strength training in their training program in an effort to determine how Laursen et al’s (2005) review applied to triathletes. A significant difference was found in the male Sprint distance triathlon group between those who included strength training in their program and those that did not. However, this was the only data group to show a significant difference with no significant difference recorded in any of the other three data groups. There may be a number of reasons for this. The first and most obvious reason is that strength training does not offer an ergonomic advantage. However, the manner in which the strength data was gathered was significantly flawed. There was widespread variation recorded in the survey regarding when triathletes employed strength training in their periodisation training. However, this was not taken into account in the statistical analysis; it was a stark choice of “Strength Training” versus “No Strength Training”. There was no consideration given to how much resistance training and what type of resistance training was used. In addition, strength training may offer significant benefits in the area of injury prevention which has not been reviewed in this work.

A comparison of weekly training hours between “High Performance” and “Regular” triathletes proved to be one of the few areas of unanimity between the four data groups. Athletes who had been classified as “High Performance” put in significantly higher weekly training hours than their contemporaries in the “Regular” classification. This is in agreement with Baker et al (2005) who found that the real significant difference between the groups in their study was found to be the total hours spent in training. However, Baker et al. found that the differences between the elite and non
elite ultra endurance athlete arose from both an earlier start age and a higher volume of training whereas this dissertation only looked at average weekly training volume rather than lifetime training volume. On the other hand, when the weekly training hours were correlated against finishing times, there was only a modest correlation in the male and female sprint data as well as the male Olympic distance data and a very low correlation in the female Olympic distance data. There was a low to very low correlation in all data groups between finishing times and the number of hours spent training per week at the peak of the athlete’s sporting career in their primary background sport, the age at which they took up that sport and the number of years spend in that sport. The coefficient of determination (obtained by squaring the r value and multiplying by 100 to obtain the percentage) clearly shows that the percentage of the total variance in an athlete’s finishing time as a result of variance in all three variables is extremely low. The appropriate independent groups test was conducted on the same variables using “High Performance” and “Regular” as the grouping factor. While a significant difference was found between the primary sporting background peak weekly training hours of the “High Performance” group versus the “Regular” group in the female sprint distance data, this result did not hold true for any of the other groups. The age at which the groups started their primary sport was found to be significantly different in both the male and female sprint distance athletes. This would suggest a certain level of agreement with Ericsson et al (1993) who advocates early practice, but the results of this dissertation suggest that it is early involvement in sport that is important, not necessarily early involvement in triathlon as a specialisation which ties in with Baker et al. (2006). This certainly holds true for the current Olympic champion Jan Frodeno who didn’t start in the sport of triathlon until the age of 19 but who came from a swimming and surf lifesaving background.

4.2 Critical Analysis of the Dissertation
There are a number of flaws in this study which should be recognized. The true random nature of participant selection should be questioned. It may be seen from the breakdown of the sexes, that there was a strong male majority. Although females are still in the minority in the participation figures for
triathlon, the figures in this study are not a perfect reflection of current trends. USA Triathlon has indicated female membership figures of 36% and the majority of the participants in this study came from the US. Although the triathlon membership figures for females in Triathlon Ireland is somewhat lower at 26%, this is still considerably higher than the female participation figures in this survey of 20%.

The method data collection, although with its own advantages of reduced cost and paper, unarguably targets the higher social demographic with greater access to education given that access and knowledge of a computer and the internet was required to participate in the survey. While the triathlon demographics highlighted in chapter two would indicate that this is not an unreasonable requirement it does indicate that the study is not completely egalitarian. Random sampling was used in this survey and was dictated purely by the decision of the athlete to participate in the survey. The result was data that predominantly failed the Kilmogorov-Smirnov (for samples greater than 100) or Shapiro-Wilk (for samples less than 100) test for normality. It’s possible that the use of strategic sampling would have yielded a normally distributed population allowing the more powerful parametric tests to be used in the analysis. In addition, athletes had to choose their times from a drop down box which listed times in five minute blocks. On reflection, it may have been better to have three separate drop down boxes for hours, minutes and seconds. This would have resulted in more accurate times and may have contributed to the data resulting in a more normal distribution.

The only condition for participation in the survey was to have completed one ITU sprint distance event and/or one ITU standard/Olympic distance event. However this proved problematic with the US participants as it would appear from feedback received through the medium of the internet forums that sprint distance events in the US are not run to the ITU sprint distance format. The swim in a sprint distance in the US is generally 500m. To compensate for this, participants were asked to estimate their
swim time by multiplying their best 500m time by a factor of 1.5. It would appear from some of the
times given that they just gave their 500m time which casts some doubt on the realistic times
estimated as to whether or not the multiplication factor of 1.5 had been applied to them. This may
have resulted in a falsely high number of athletes having been classified as “High Performing” in the
male and female sprint distance data groups. Only in the case where the sum of a participant’s best
swimming, cycling and running split in any number of races was in fact greater than the participants
alleged best time in a race of the same distance was the data seemed to be fraudulent and disregarded
from the statistical analysis. This also ties in to the fact that considerably fewer of those who were
categorized as “High Performance” in the Sprint distance data group were subsequently recognized as
high performance in the Olympic event. However, a possible error in data entry is not the only likely
reason for such a phenomenon. One of the possible reasons for this is the use of the wetsuit. Chatard,
Senegas, Selles, Dreanot, and Geyssant, (1995), examined the time (minutes) taken to swim 400m by
competitive swimmers and triathletes who were wearing either a wetsuit or standard swimming
trunks. They found that triathletes swimming 5 minutes 07 ± 30 seconds for 400m, improved 22
seconds or 30m when a wetsuit was used. Competitive swimmers completing 400m in 4 minutes 12.5
± 7 seconds did not improve. However, those athletes swimming 4 minutes 39 seconds improved 12
seconds when wearing a wetsuit. This would suggest that slightly weaker swimmers will gain a
greater advantage through the use of a wetsuit than their faster counterparts over a short distance.
However De Lucas, Balikian, Neiva, Greco, and Denadai (2000) showed a much smaller performance
improvement over 1500m (3.7%) in triathletes and swimmers who averaged 1.17m/sec than Lowdon
et al. found in triathletes swimming at 0.90 m/sec (10%). It is understood that the reason for this is
that velocity is lower during the swimming stages of longer distance triathlon events. Therefore,
Bentley, Millet, Vleck and McNaughton (2002) believe it is likely that the change in velocity with
different swimming distances will result in a change in the physiological benefits gained when
athletes wear a wetsuit during swimming.
On reflection, the survey was a little over ambitious in the amount of data which was collected. This was quite obvious from the three hundred and thirty three participants who started but failed to finish the survey. There was considerable surprised on the part of the author on the enthusiasm of the response from the triathletes and as a result, there were a considerably higher number of surveys to review than anticipated. As a result there are a number of aspects of triathlete training patterns that have been gathered by the survey but have not been fully explored in this dissertation. For example, the study looks at whether or not there is a relationship between employing periodisation and finishing times but it fails to look at exactly how each athlete employs periodisation. The survey also looks at what the athlete themselves consider as their weaknesses and strengths but does not run any tests on how their strengths and weaknesses impact their training programs. Do the “High Performance” athletes focus a much higher percentage of their training time on their weaknesses than their “Regular” counterparts? If the knowledge gained in hindsight regarding the numbers that would respond to the survey had been available at the start, the survey may well have been constructed differently.

4.3 Suggested Areas of Further Study
The critical analysis of this dissertation has already pointed out that there was a lot of data gathered by this survey that was not given due consideration. This data should be analyzed to gain insight into the training patterns of triathletes at all levels. In addition, there were a number of factors that were not considered in this survey which have a huge impact on a triathlete’s performance. There was no consideration given to diet, height, weight or power to mass ratio. Certainly, it would be expected that there would be a strong influence from diet and power to mass ratio on finishing time performance. The presence of a coach is extremely influential in the life of an athlete. Is there a significant difference between externally and self coached athletes?
This particular questionnaire looked to see if a particular background sport offered an advantage to entering triathlon, it would be interesting to examine whether or not there is a sport that perhaps hinders performance. For example, elite triathletes tend to be light with a high power to mass ratio. Does this mean that someone coming from a sport such as rugby where hypertrophy of the muscular system is commonplace will find themselves at a disadvantage?

An equivalent study among elite athletes could offer some interesting insights. Are there any significant differences between the sporting background of elite triathletes and their age group counterparts? Due to the bike drafting in elite triathlon, the statistics from the ITU (International Triathlon Union) would indicate that unless you are very close to the leaders in the swim leg and one of the fastest 10km runners, your chances of victory are seriously diminished. British Triathlon’s (Mazda) Talent Identification program looks only at young athlete’s swim and run performance and puts very little weighting on their cycling ability (Perry (2008)). This would suggest that the elite athletes of the future, at least in Britain, will come from either swimming or cycling backgrounds. The likelihood is that it would be more constructive to conduct such a survey with former elite athletes as elite athletes who are still racing are unlikely to wish to share their training patterns, even in an anonymous survey.

An obvious follow on from this survey is to conduct a study with a group of athletes of a similar standard in their respective sports, swimming, cycling and running. Ideally they would have no competitive or training background in either of the other two sports and would have very similar values \( \dot{V}O_2 \text{max} \). The \( \dot{V}O_2 \text{max} \) test should be done through the athlete’s current sport to allow for more accurate values in accordance with Dabney & Butler (2006). The athletes would be trained for the same triathlon event through similar supervised training programs. The experiment would include
regular laboratory testing in all three sports and culminate in a triathlon event. The results of the triathlon along with the intermediary testing in the laboratory would provide interesting data to analyse.

4.4 Conclusion
Triathletes come to the sport of triathlon from a huge variety of sporting backgrounds with a very small percentage coming into the sport from no previous sporting background. Although there does not appear to be an irrefutable victor in determining which sport offers a competitive advantage to triathletes entering the sport, this study would certainly suggest that swimming is the frontrunner with the lowest mean finishing time in three data groups, and statistically significant differences in two data groups. Running should not be discounted though, as there was no case where swimmers were found to have statistically lower finishing times than runners and in the recruitment of junior elite triathlon talent in the UK, it is the run and swim times which are given the most credence. As cycling comprises the longest part of a triathlon in both time and distance, it is surprising that no advantage appeared to be gained by having a background in cycling. This may be because it is the easiest of the three sports to adapt to from an alternative sporting background but additional research would be required to confirm this theory. Training hours proved to be very significant with “High Performers” having a consistently higher volume of weekly training than their “Regular” counterparts. Triathletes had a very high awareness of the concept of periodisation with statistical differences in finishing times between those who employed periodisation, those who did not and those who were unaware of the concept, coming to light in three of the four groups. However some inconsistencies in the statistical results may be as a result of a lack of uniformity in the way periodisation was being employed. Athletes who employ strength training were only found to have significantly lower finishing times in the case of male sprint distance athletes but this may have been due to the method the data was gathered and analysed. There was some evidence that early learning was advantageous but only to the
extent of becoming involved in sport; specialization at a young age did not appear to be a criterion for success at age group level in the sprint and Olympic distance triathlons.